TECHNOLOGY DEPT

A PICTORIAL SURVEY OF CURRENT PRACTICE, EQUIPMENT AND MATERIALS

Construction Methods

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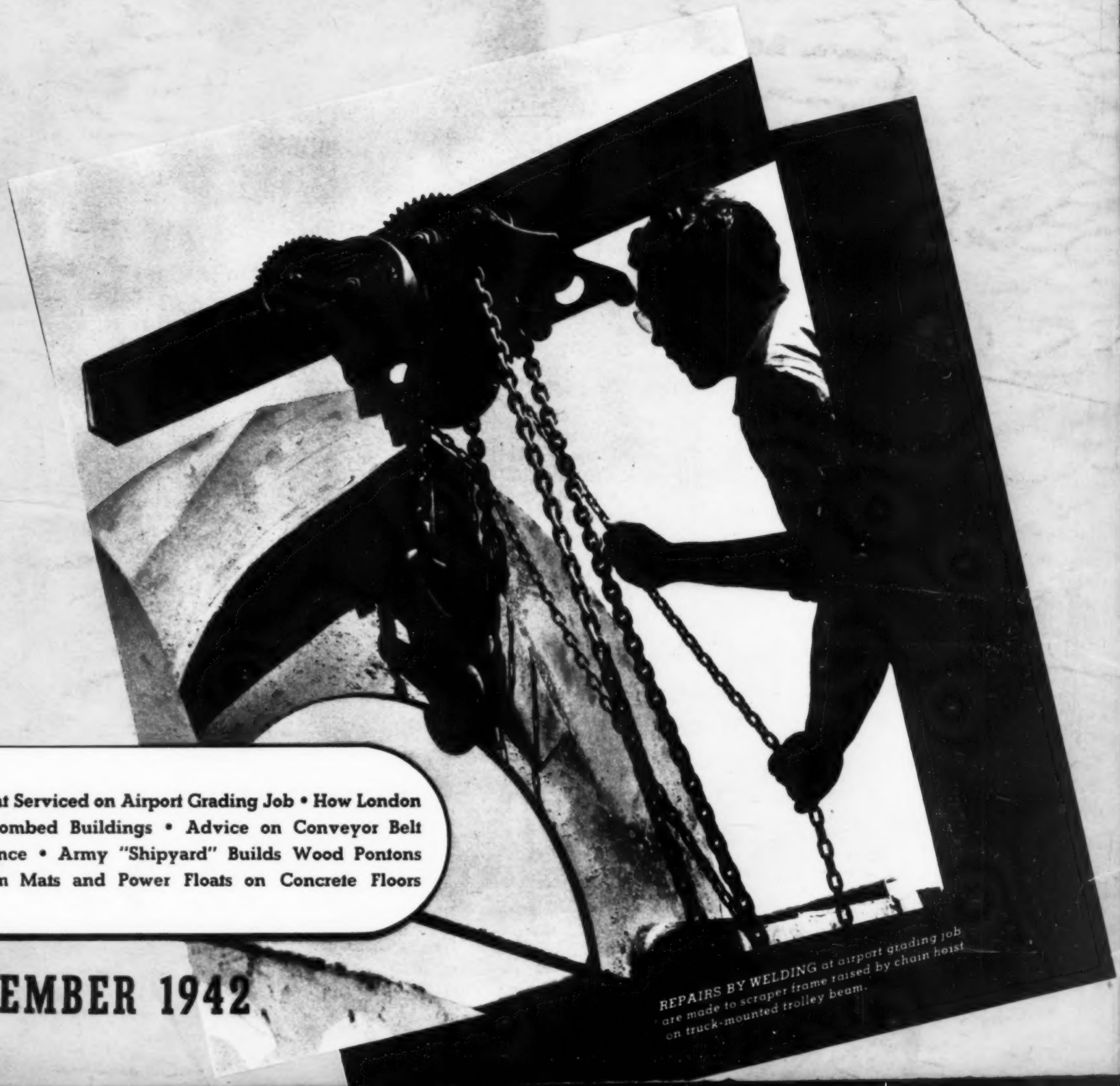

REPAIRS BY WELDING at airport grading job are made to scraper frame raised by chain hoist on truck-mounted trolley beam.

quipment Serviced on Airport Grading Job • How London
epairs Bombed Buildings • Advice on Conveyor Belt
laintenance • Army "Shipyard" Builds Wood Pontons
Vacuum Mats and Power Floats on Concrete Floors

DECEMBER 1942

SUPPOSE

He Took "Time-off"..

The doughboy stays at his post come hell or high water. He knows his duty and he does it.

To shirk that duty would mean defeat, even death—and disaster for all of us.

But he cannot carry on the fight alone. He must have guns, ammunition, supplies.

That is our job!

Unnecessary "time off" means lost ships, guns and shells —lost just as surely as if they were destroyed by our enemies in battle.

Stand by our fighters—stay on the job until the fight is won!

INLAND STEEL CO.

38 S. DEARBORN ST., CHICAGO, ILL.

Sales Offices: Milwaukee, Detroit, St. Paul, St. Louis, Kansas City

We will be pleased to send you poster size, three-color reprints of this ad, without signature for your own use.

CURRENT JOBS

.... and Who's Doing Them

BUILDINGS

Public—Navy Department awarded a $37,315,626 contract for buildings and improvements in Sampson, N. Y., to **John A. Johnson Construction Co. & Mt. Vernon Contracting Co.**, of Brooklyn, N. Y. In McAlester, Okla., Navy Department awarded a $30,000,000 contract for facilities to **Brown & Root, Inc.** and **W. S. Bellows Construction Co.**, of Houston, Tex. A Federally financed, $27,000,000 contract for plant building expansion in California is under way by **Henry J. Kaiser Co.**, of Oakland, Calif. **Maxon Construction Corp., Inc.**, of Dayton, Ohio, was awarded building contract in Hastings, Neb., for $26,290,466. **M. T. Reed Construction Co.**, of Belzoni, Miss., received a $10,000,000 Navy Department contract for advance base depot and camp for construction battalions in Gulport, Miss. Successful bidders for industrial plant contract were **Winston Bros., Hagline Construction Co., Missouri Valley Bridge & Iron Co.** and **Sollitt Construction Co.**, of Port Neches, for approximately $10,000,000, to be Federally financed. Military housing project is under construction in Illinois by **Paul Steenberg Construction Co.**, of St. Paul, Minn., **Schumacher Madsen Watson & Associates**, of Minneapolis, and **Carl E. Erickson & Co., Inc.**, of Chicago, Ill., at total estimated cost of $7,500,000.

Additional facilities for Navy Department are under way in Texas by **Norgaard & Shaw, Vilbig Bros., Inc.**, and **Nathan Wohlfeld**, of Dallas, for $6,203,000. Contract for military housing, roads and utilities in North Carolina went to **J. A. Jones Construction Co.**, of Charlotte, for approximately $5,000,000. A Marine Corps Training Area is under construction in Santa Margarita, Calif., by **Engineers Ltd.** and **J. H. Haddock, Ltd.**, of San Francisco, amounting to $9,681,940. **Peter Kiewit Sons, Inc.** and **George W. Condon Co.**, of Omaha, Neb. were awarded contract for additional facilities in Hutchinson, Kan., at cost of $5,440,000. **H. K. Ferguson Co.**, of Cleveland, Ohio, will build two plants in Louisiana at an estimated cost of $5,000,000 each. Navy Department contract for additional facilities in Hawthorne, Nev., went to **Wm. P. Neil Co., Ltd.**, of Los Angeles, Calif., with bid of $5,966,000. Buildings are under construction in Illinois by **John Felmley Co.**, of Bloomington, for more than $5,000,000.

HEAVY CONSTRUCTION

Contract for 857 mi. of 24-in. pipeline from Norris City, Ill. to Phoenixville, Pa., went to **Williams Bros. Corp., O. E. Dempsey Construction Co., Anderson Brothers**, and **Sheehan Pipe Line Construction Co.**, all of Tulsa, Okla., **Oklahoma Contracting Co.**, of Dallas, Tex., **C. S. Foreman Co.**, of Kansas City, Mo., and **Ray E. Smith Construction Co.**, of Eldorado, Kan., estimated to cost $60,000,000, to be financed by Defense Plant Corp. Navy Department awarded contract for improvements in Clinton, Okla., to **Chas. M. Dunning Construction Co., Patterson Steel Co.** and **G. H. James Co.**, of Oklahoma City, Okla., for $7,044,000. Improvements are under way in Houma, La., by **Horace Williams Co.**, of New Orleans, at cost of $6,876,334. Improvements and facilities are under construction in Ottumwa, Ia., by **George Sollitt Construction Co.**, Lancaster Corp., and **White Consolidated, Inc.**, of Chicago, Ill. amounting to $5,413,000. A bid of less than $3,000,000 obtained for **M. W. Watson**, of Topeka, Kan., contract for buildings and improvements in Kansas. Additional facilities are under way in San Diego, Calif., by **M. H. Golden & W. Trepte**, local contractors, for $3,501,000. In Norfolk, Va., a pier is under construction for Navy Department by **Tidewater Construction Co.**, local contractor, for $2,100,000. In Florida, **Ebersbach Construction Co.**, of Tampa, was awarded contract for improvements to cost between $1,000,000 and $5,000,000.

HIGHWAYS

Among recent highway contract awards are the following: Alabama: $318,301 to **Mitchell Bros. Construction Co.**, of Birmingham. California: $699,045 to **Frederickson & Watson Construction Co.**, of Oakland; $52,918 to **Frederickson** Bros., of Emeryville. Florida: $1,000,000 to **Mills & Williams**, of Miami. Illinois: $899,945 to **I. D. Lain Co.**, of Springfield. Michigan: $557,579 to **Bridgeport Core Sand Co.**, of Saginaw; $468,755 to **Lewis & Frisinger Co.** and **E. B. Schwaderer**, of Ann Arbor; $1,000,000 to **J. W. Bihimire**, of Three Oaks. North Carolina: $527,682 to **Atkinson Dredging Co.**, of Great Bridge, Va. Oklahoma: $460,366 to **Smith Bros.**, of Noble. Ohio: $641,418 to **Hinman Bros. Construction Co.**, of Pittsburgh, Pa.; $319,858 to **D. D. Mullett**, of Pittsburgh, Pa.

DECEMBER, 1942

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Construction Methods

A Pictorial Survey of Current Practice, Equipment and Materials

JOHN ABBINK, Publisher
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Editorial Staff: Vincent B. Smith, Paul Wooton (Washington)
N. A. Bowers (San Francisco) Nelle Fitzgerald

A McGRAW-HILL PUBLICATION

The HOW of it

For the benefit of readers concerned with the practical application of method or equipment the following references are to articles or illustrations in this issue that tell:

How **CONCRETE AND WOOD TIRES** on portable compressor saved rubber. —p. 39
How **SHOP FACILITIES** were provided for equipment maintenance on airport grading job. —p. 42
How **BLAST HOLES** were put down to 80 ft. depths by well drill rigs. —p. 42
How **TALL FLOODLIGHT TOWER** illuminated night operations on big airport grading job. —p. 43
How **PRESSURE LUBRICATION** was supplied to equipment in field by specially equipped truck. —p. 44
How **BLACKSMITH SHOP** on earthmoving job was equipped to produce new machinery parts and make repairs. —p. 44
How **WOOD PONTONS** for floating bridges were built by prefabrication methods at Army shipyard. —p. 46
How **BOMBED BUILDINGS IN LONDON** were repaired temporarily by special service squads. —p. 48
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How **CONCRETE ROOF ARCHES** for industrial plant addition were poured with aid of 100-ft. long movable forms. —p. 54
How **CONVEYOR BELT** should be maintained to assure effective service and long life. —p. 58
How **SPECIAL TRACK SHOES** on crawlers enabled tractors to operate on railway rails. —p. 61
How **POWER TRANSMISSION LINE POLES** were prepared for attachment of crossarms. —p. 62
How **LARGE TREES WERE FELLED** with electrically-operated chain saw. —p. 62
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How **GLUE GUN** applied adhesive in prefabricating wood panels for mass house construction. —p. 62
How **WATERPROOF PAPER** cured concrete on paved airport runways. —p. 63
How **DRINKING WATER** was provided for construction workers from special tank truck. —p. 63
How **IMPACT WRENCH** quickly tightened nuts on wire rope clips of cableway. —p. 63
How **VACUUM MATS** and power machines speeded concrete floor finish. —p. 68
How **BEADED TRAFFIC LINES** on highways were provided to aid night driving. —p. 70

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Electronics—Secret Weapon of War

Presager of a New Scientific and Industrial Era

THE END of World War I left scientists with a new plaything. They did not know it at the time but they had their hands on a revolution. Within two years the world had radio broadcasting. Within ten years the whole art of motion pictures had been transformed as talking pictures replaced silent movies. Within twenty years television was born and people were seeing pictures in motion by radio.

The fulcrum of this revolution is the electron tube, a new tool of illimitable possibilities. One form of the electron tube is the familiar radio tube; the much publicized electric eye is another. There are many other forms, each having distinct capacities for saving time, saving energy, saving money, protecting life, limb and property.

The electron tube puts the electron to work—and the electron is the basic building-block of the universe.

Electronics is the new art, the new science of putting the electron to work. Radio and sound pictures and television are aspects of electronics; but there are many other facets of this revolution which have been brewing since the last war.

The electron tube has a typical American family tree. Edison made the basic discovery of the "Edison effect" some sixty years ago. This was followed by the invention of the "Fleming valve" and the "de Forest grid". Then Armstrong contributed his share, and hundreds of engineers in garret and cellar workshops and in the great university and industrial laboratories went to work on the tubes which employ electrons. The tube was a plaything before the last war but the world conflict brought it out of the toy stage and made it a practical, powerful tool.

Today the electron tube is guiding the destinies of the greatest armies and fleets ever engaged in the history of the world.

It is a part of the nerve center of the battleship, directing its course, finding its adversaries, broadcasting running accounts of air battles to its crews, directing gun fire and determining ocean depth.

In the air it is the means of locating and identifying enemy planes, piloting planes automatically, giving communication from plane to plane and to shore. It is even operating the controls of the plane.

In the maneuvering tank, in the officer's car, on the back of a foot soldier it transmits and receives vocal messages from every unit of the fighting forces.

Along our borders, and those of our Allies, is an electronic screen which counts, follows and identifies enemy planes a hundred miles away through darkness and through fog.

In industrial plants there are electronic counters that enumerate passing articles faster than the eye can see; automatic sorters which discard defective, oversize, undersize, off-color articles; automatic cutters; devices which inspect the inside of things which the eye cannot see; controls which protect workers; controls of temperature; smoke eliminators; intruder alarms; automatic controls for whole batteries of machines.

In its October progress report on American industry, the War Production Board points out that the radio business is five times greater than a year ago. From 20 million dollars a month last fall, it has increased to well over 100 million dollars a month. Unfilled war orders are in excess of 4 billion dollars.

From such vast growth will emerge a new engineering of products which will immeasurably improve our peace-time living.

After the war broadcasting will be infinitely more satisfactory: radio receivers will perform with a new fidelity which will amaze us. Television reception will be as flawless as the motion picture. Present secret war developments will readily be convertible to peace-time devices that will improve our standard of living.

No longer will ships collide with other ships, with icebergs or the shore. No longer will trains collide and aircraft crash in flight.

Garage doors will open as we approach and automatically close themselves. Electric lights will automatically go on and off according to our wants and needs. Furnaces and boilers will be controlled and smokestacks will cease to belch wasteful smoke. Air will be made dust free and germ free. Food contamination will be checked, meat made tender.

Grade crossings will be made safe and auto traffic will be automatically controlled.

Medical science sees new wonders ahead. Already it is possible to see "whiskers" on germs, germs which heretofore had been but a blur when viewed through the strongest optical equipment available.

Today so much secret development is going on in the ultra-high-frequency field that little can be said of its great future. But, without divulging military secrets, it can be said that ply-wood is being dried electronically in minutes instead of hours. Ultra-high-frequency welding (not to be confused with flame welding controlled electronically) is being done dramatically and efficiently.

Ultra-high-frequency heating promises to revolutionize the baking industry—it may even heat our homes.

What is this miracle working tube that can see, hear, taste, feel and smell a thousand times more sensitively than was possible heretofore?

What is the electron? No one knows, not even the scientists who know how to employ it. Electrons cannot be seen or felt, but if 6¼ million million million electrons are pushed through a 100-watt electric lamp per second, it will light up to full brilliance. For electric current merely is a mass movement of electrons. Each electron carries its share of electricity, and since the electron has so little weight it can be moved easily and quickly. Therefore, electricity transported by electrons can be turned on or off with great ease and speed. The electron tube merely is a device that controls the flow of electricity. It is an amplifier of power which can be made to do wondrous things. The sound of a termite gnawing inside of a log can be amplified a million times . . . to a roar that can be heard over great distances.

Colors can be classified and matched to a degree not possible by any other means.

Chemical or vitamin consistency can be recognized by counting radio activity within the subject being analyzed.

There is no industry in which electronic circuits cannot be used to speed up production, to increase accuracy, to do heretofore impossible tasks of calibration and measuring.

The opportunities afforded the engineers who are developing this new "electronic age" are limitless.

* * * *

Today the electronic industry is 100% at war. It is meeting the exacting demands made upon it.

Never before was electronic equipment called upon to withstand temperatures ranging from 75 degrees below to 150 degrees above zero Fahrenheit. Never before did radios and transmitters have to withstand the shaking and abuse to which they are being subjected today.

War demands have called for much redesign, much change of materials and a new conception of operating to tolerances never dreamed of in peace-time material. As a result, electronic parts and equipment makers are building better devices.

Universities and colleges are working at top speed to produce electronic engineers, for every radio operator in a plane, every radio man in the ground forces and on ships, every man operating radar equipment or electronic control devices in ordnance . . . and there are many thousands of them . . . must be a trained technician.

The wall of military censorship is high but it is no secret that one of Britain's best weapons that keeps the Luftwaffe from exterminating London is a radio locator, a device that gives alarm of approaching planes long before they can be seen with telescopes. Scanning the horizon constantly the locator warns of the enemy's approach. In the nose of a night fighter, the locator informs pilot and gunner when the enemy is within range. Neither is it a military secret that gunfire can be controlled by electronics, and that electronics is having a big share in training our new armies.

Necessity draws a veil over the most dramatic uses of electronics in warfare, but among those who know there is nothing secret about the fact that many of today's wartime applications will revolutionize our peace-time lives. Electronics will invade every industry with totally new devices and machines. The future of the electronics industry is limited only by man's imagination.

Such is electronics, and its destiny!

James H. McGraw, Jr.

President, McGraw-Hill Publishing Company, Inc.

This is the sixth of a series of editorials appearing monthly in all McGraw-Hill publications, reaching more than one and one-half million readers, and in daily newspapers in New York, Chicago and Washington, D. C. They are dedicated to the purpose of telling the part that each industry is playing in the war effort and of informing the public of the magnificent war-production accomplishments of America's industries.

MAKE IT HOT FOR THE AXIS!

DON'T LET WINTER SLOW DOWN VITAL WAR PROJECTS

A CRITICAL WAR WINTER is ahead of us. No time, this, to let cold weather slow down vital construction. Keep jobs on schedule, even in sub-freezing weather . . . use 'Incor' 24-Hour Cement . . . save time, money, worry.

Help make it hot for the Axis by speeding war construction. Heat mixing water and aggregates . . . protect the concrete promptly after placing. 'Incor' utilizes heat protection three times as effectively, because it hardens in one-third the usual time, cutting heating costs in direct proportion to the time saving.

Fifteen years' performance shows that 'Incor'* pays its way in heat and labor savings alone. High speed schedules . . . 50% to 60% less forms. Geared to the needs of wartime construction.

*Reg. U.S. Pat. Off.

LONE STAR CEMENT CORPORATION

Offices: ALBANY • BIRMINGHAM • BOSTON • CHICAGO • DALLAS • HOUSTON • INDIANAPOLIS • JACKSON, MISS.
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LONE STAR, WITH ITS SUBSIDIARIES, IS ONE OF THE WORLD'S LARGEST CEMENT PRODUCERS . . 15 MODERN MILLS . . 25-MILLION BARRELS ANNUAL CAPACITY

REPLACEMENTS
are as big a problem *at home* as at the Front. For avoidance of replacement problems and preventable overhaul lay-offs in the *CONSTRUCTION* field use . . .

. . . SINCLAIR PENNSYLVANIA and OPALINE MOTOR OILS,
Sinclair specialized gear oils and greases. These lubricants give protection that keeps wear negligible and promotes delivery of full designed output from heavily worked equipment.

Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.

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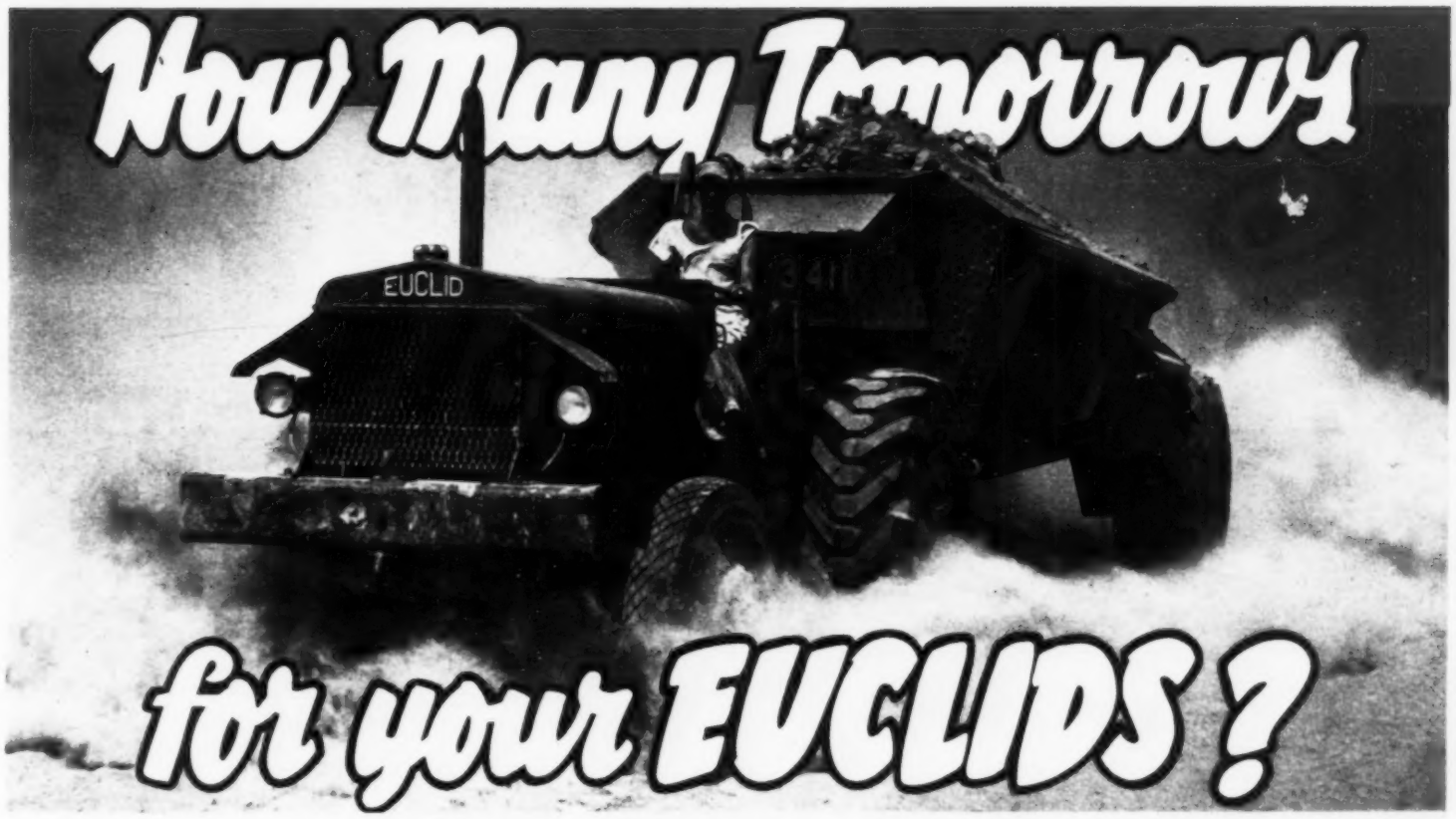

● Today as never before Rear-Dump and Bottom-Dump EUCLIDS are proving that they have what it takes to get the big jobs done in record time. They are hauling capacity pay loads on round the clock schedules on all kinds of tough jobs. Many of those "Eucs" have been in service much longer than their normal operating life because they were serviced regularly and operated with a little extra care.

How many tomorrows there will be for your "Eucs"—how many extra hours of operation they will provide—depends largely upon the care and maintenance you give them *now*. Work your Euclids extra hard to get those important jobs completed, but don't neglect to service them regularly just because they are providing trouble-free performance. When you need parts or repair service, call on your Euclid Distributor for help in keeping your "Eucs" working on the jobs that mean so much to America.

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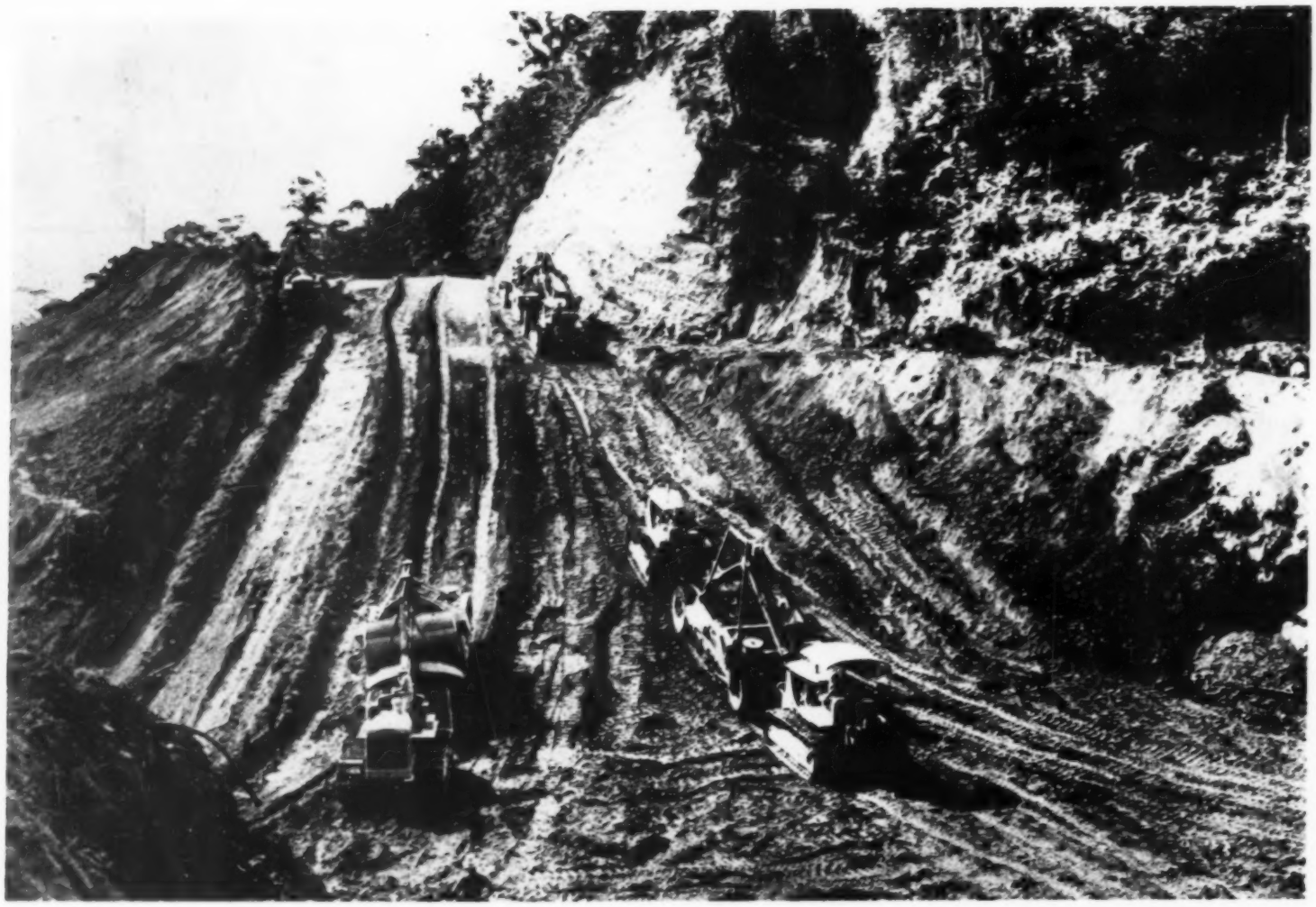
CLEVELAND · · · · · · · · · OHIO

EUCLID SELF-POWERED HAULING EQUIPMENT
For EARTH . ROCK . COAL . ORE
CRAWLER WAGONS · ROTARY SCRAPERS · TAMPING ROLLERS



They're Finishing the World's Longest Highway

A typical example of B. F. Goodrich leadership in truck tires

YOU'RE looking at a small section of the great Inter-American Highway. When completed this highway will be the longest in the world, linking Alaska with the Panama Canal!

Some day you'll be able to spend your vacation driving comfortably over its paved surface—through Mexico, Honduras, Costa Rica, and on to the "big ditch".

But that's *some* day.

Right now this vital route is being rushed to completion for military reasons. Army and civilian engineers are waging a day-and-night blitzkrieg against nature to get it finished quickly. To do this they must work in all weather—edging their way around breath-taking slopes, pushing through shoulder-high jungle growth, fighting muck and mire and shifting sand.

It takes the best that's in a man or a machine to build this great highway. And it takes the best tires that science can produce to hold up under such relentless punishment. That's why B. F. Goodrich Tires have been selected to play their part. Anyone who has been in the construction business knows of the research that is constantly going on at B. F. Goodrich to develop such tough, mud-fighting, long-wearing rubber "huskies". A typical example of B. F. Goodrich leadership.

B. F. Goodrich Silvertowns for trucks and buses have a well-deserved reputation for long, trouble-free service. Every one of them is made with a Load-Shield that protects against road and load shocks, and is fortified with Duramin, the amazing B. F. Goodrich chemical discovery that keeps rubber young and tough. So when you next secure a truck tire ration certificate see your B. F. Goodrich Dealer *first*, for B. F. Goodrich is First in Rubber.

Earth Service Silvertown
The last word in surefooted traction. Jumbo cleats form a balanced, non-skid, self-cleaning tread design.

Rock Service Silvertown
Rugged, closely-knit tread for resistance to cutting. The best tire for quarrying, strip mining, rock excavating.

Universal SuperTraction Silvertown
Gives universal traction forward and backward. Extra-heavy tread and sidewalls for resistance to cutting.

In war or peace

B.F.Goodrich

FIRST IN RUBBER

OUTPUT

is just as IMPORTANT

at the end of the day as at the beginning

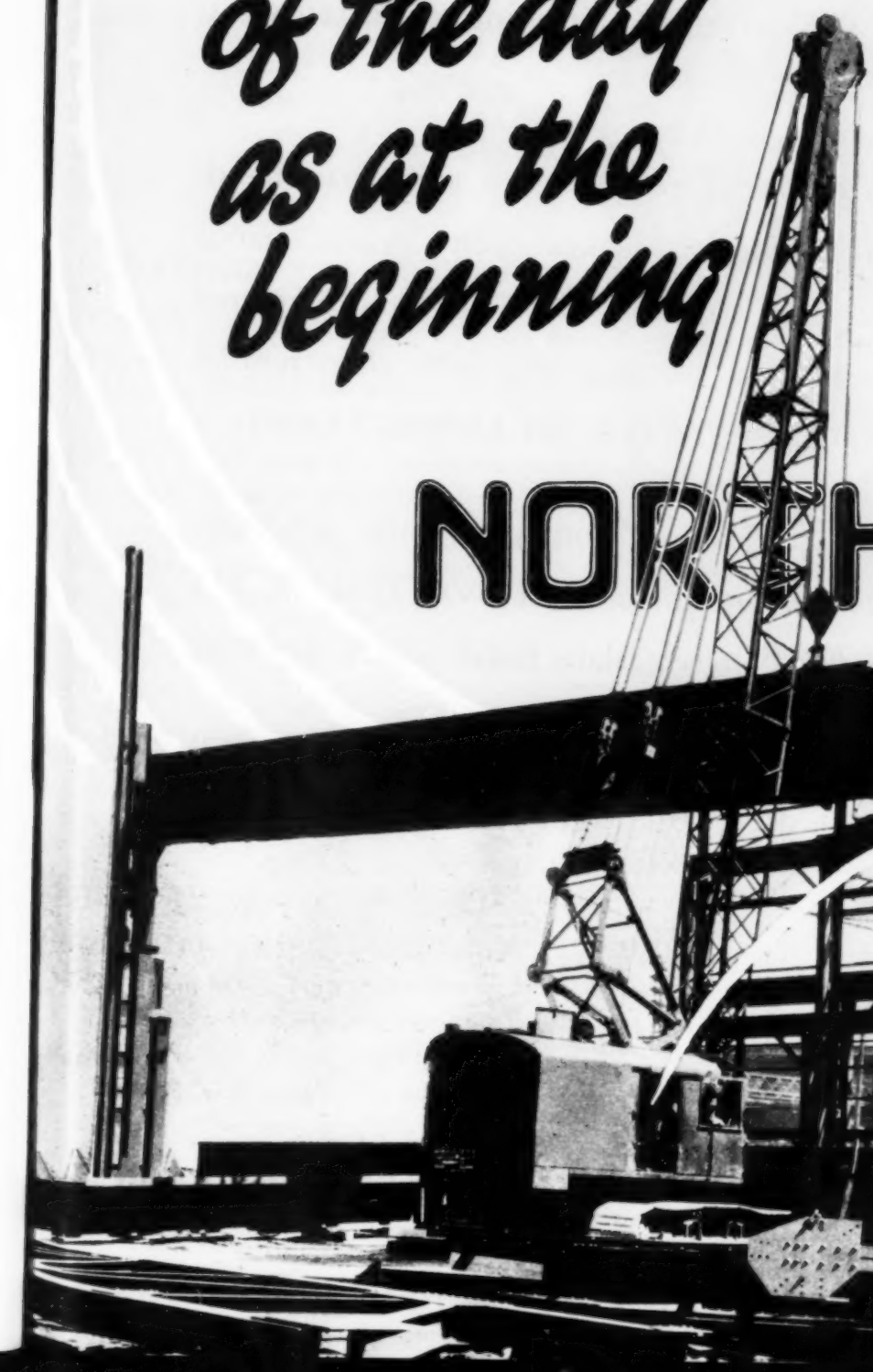
YOU can't do it with mirrors! It needs a sensitive touch—and it needs the right equipment.

Northwest makes it easier with the "feather-touch" Clutch Control. You can *feel* the load. You can inch it in fractions of an inch to just the right point. Release is positive and best of all, the heavy work of shifting the drum clutches is done by the power of the engine.

With a Northwest, the output curves stay high and even all day long. The "feather-touch" Control is just another reason why Northwests get things done—and that's what counts today!

NORTHWEST ENGINEERING CO.
1728 Steger Building, 28 E. Jackson Boulevard
Chicago, Illinois

NORTHWEST



the "Feather Touch"
CLUTCH CONTROL
means
MORE WORK DONE!

Whiteman Machines Cut Concrete Finishing

Save Manpower, Time and

HERE'S THE WAY to lick the manpower shortage: Put WHITEMAN power-driven machines on your concrete slab jobs. They get the job finished in two-thirds the time — produce a stronger, denser, longer wearing concrete surface.

Proved on hundreds of jobs, large and small, the WHITEMAN "3-Step" Precision Method reduces manual labor by mechanizing (1) Screeding, (2) Floating, (3) Finishing of concrete slabs, indoors or out.

Operation of these machines requires less skill than hand-tools. A brief period of instruction makes even "green" hands proficient. That's why you see so many WHITEMAN Machines working everywhere these days on big war jobs that require BETTER concrete work, done FASTER, AT LOWEST COST!

Let the "Construction Soldiers" on your jobs get more war work done every shift. Arm them with WHITEMAN Machines. You will have better concrete slabs faster — at lower cost.

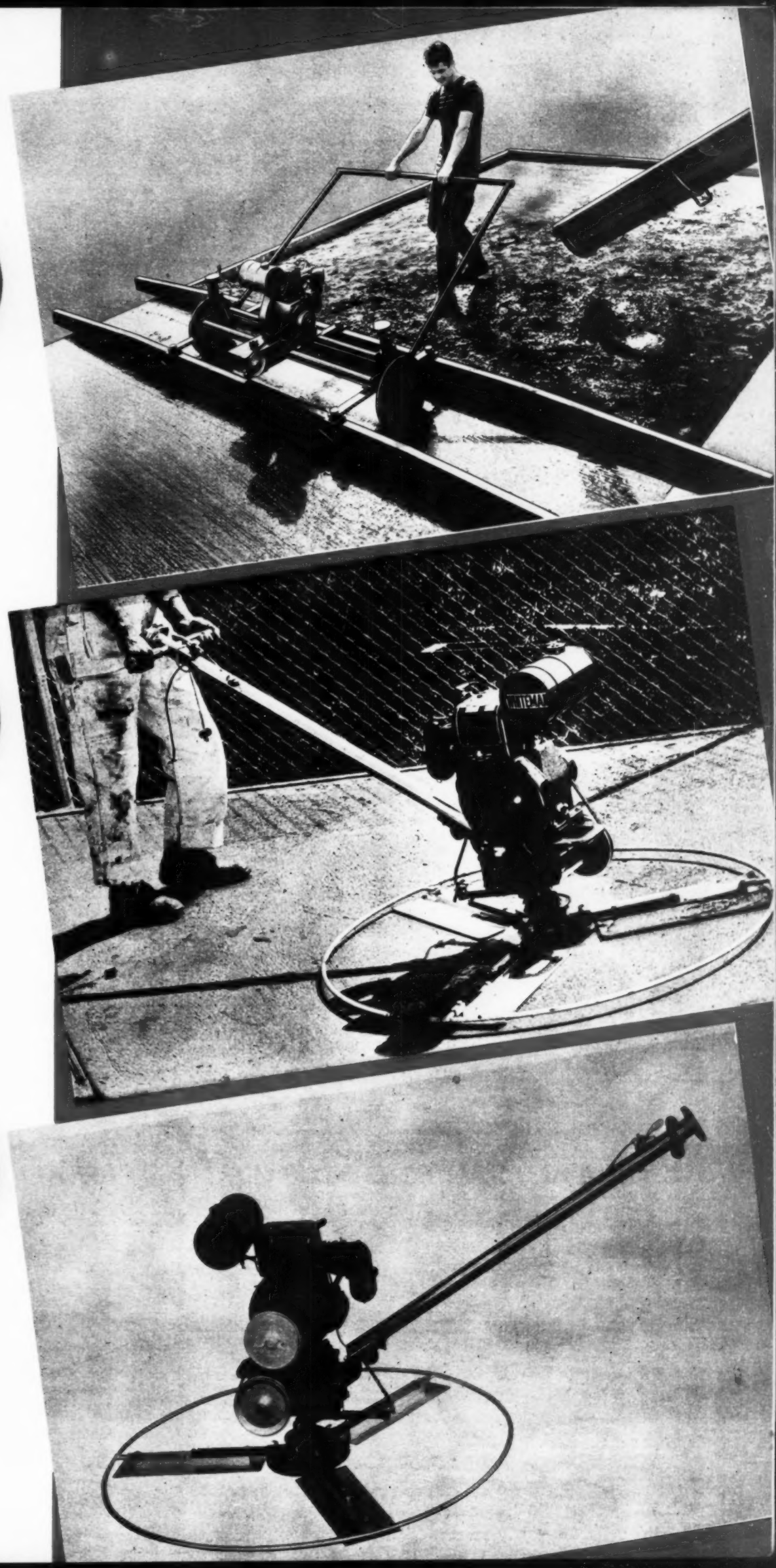
Write or wire today for the name of your nearest WHITEMAN distributor. He will show you how to save manpower, time and money on jour jobs.

Whiteman MANUFACTURING CO.

3249 Casitas Ave. **Los Angeles, California**

Time 40%

Money



STEP 1

SCREEDING

The WHITEMAN Rodding Machine, operated by one man, has power operated screeds, making 5-in. transverse strokes while riding on the header boards. A perfect strike-off is obtained. The operator, with a steady forward pull, advances the machine while it simultaneously levels and compacts the mix. Low slump mix is no problem—this machine handles 4 yd. or 1-in. slump in 5 minutes.

STEP 2

FLOATING

When you are ready to float the slab, attach the "Heavi-Duti" (10″ x 18″, 12-gage steel) trowels to the WHITEMAN dual-purpose Finishing Machine. One man can cover 1000 sq. ft. in 15 minutes. The strong, broad, rotating trowels level and compact the slab, bringing the moisture to the surface, producing a perfect floating finish. When the "floated" slab has set sufficiently it is ready for Step 3.

STEP 3

FINISHING

Attach the (6″ x 18″, 17-gage steel) "Finish" trowels to the same dual-purpose WHITEMAN Finishing Machine and again one man can cover 1000 sq. ft. in as little as 15 minutes. As the rotating, controllable-pitch trowels pass over the slab a smooth, level, denser, harder surface is obtained free from voids or laitance. No hand work is necessary.

FREE WAR POSTERS

Since the present series of war poster illustrations started to appear in Wickwire Spencer advertising, requests for them have been pouring in from every part of the country. Because of this wide-spread enthusiasm, the popular poster shown above has now been reprinted with the title which won first prize in a 4-state contest among war-workers. It symbolizes to workmen America's war-*production* spirit.

The painting is by the famous artist, Boris Artzybasheff, whose illustrations appear in Life Magazine, and on Time Magazine covers. The posters are of a convenient size; will fit wherever there is a 30-inch space.

MAIL THIS COUPON

Wickwire Spencer Steel Company,
500 Fifth Avenue, New York, N. Y.

Send.....free posters, "I Pull with Uncle Sam!"

Name.....

Company .....

Address.....

Another Achievement for

WICKWIRE ROPE!

First manufacturer in all New England to be awarded the Maritime M and Victory Fleet Flag for outstanding production accomplishments.

MOVE IT FASTER, AT LESS COST AND EASIER,

LAPLANT-CHOATE equipment is busy. It is working on every front — at home and abroad. "Carrimor" Scrapers, trailbuilders and bulldozers are working to help bring the war to a quick and favorable conclusion. Scrapers and bulldozers move millions of yards of earth to build airports, strategic roads, industrial and camp sites — and they help to maintain them. These are but a few of the reasons civilian needs must be temporarily postponed until the war is won.

Engineers at LaPlant-Choate are working always toward the day that the nation can return to a civil way of life. Not only are manufacturing methods improving, but research continues at a steady pace. Every piece of equipment is receiving a share of attention, and the subjects of hydraulics and mechanics are being studied constantly. Improvements are added as they prove themselves and the resulting equipment will be better than ever. LaPlant-Choate equipment will serve you as always, but more powerfully and economically than before.

COMPLETE EQUIPMENT

These are the tools we build for Uncle Sam now— for You as soon as possible.

EARTHMOVING—Hydraulic and Cable Scrapers, Trailbuilders, Bulldozers, Rippers, Tampers, and Scraper Pushers
LAND CLEARING—Treedozers, Brushcutters, Root Cutters, Brush Rakes, Stinger Blades, Weed Eradicators, Stump Splitters
SNOW REMOVAL—Tractor Snow Plows

"TOP THAT 10% BY NEW YEAR'S!"

LaPlant-Choate Employees have oversubscribed their 10% quota

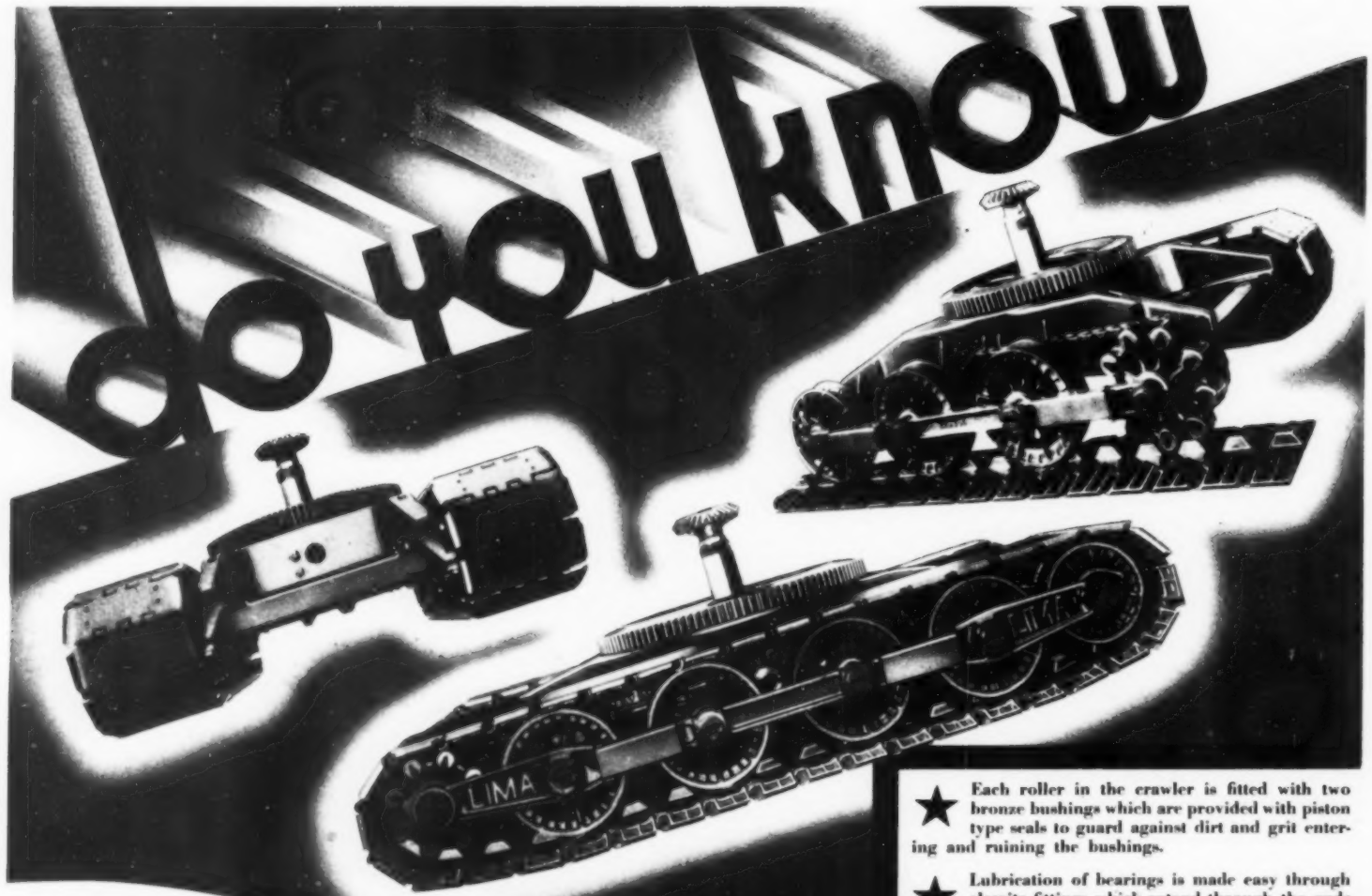
LAPLANT-CHOATE

Factory & Home Office
Cedar Rapids, Iowa

Manufacturing Co. INC.

Pacific Coast Office
San Leandro, Cal.

EARTH MOVING - LAND CLEARING - SNOW REMOVAL EQUIPMENT



YOU DON'T HAVE TO PICK YOUR PATH WITH A LIMA

LIMA

SHOVELS – DRAGLINES – CRANES

★ Each roller in the crawler is fitted with two bronze bushings which are provided with piston type seals to guard against dirt and grit entering and ruining the bushings.

★ Lubrication of bearings is made easy through alemite fittings which extend through the ends of the axles, only a few minutes are required to service the entire crawler.

★ A simple arrangement for adjusting the crawler belt is located on the ends of the truck axles where access is easy.

★ The large diameter rollers keep the truck bushings high out of the mud. They are few in number and require less attention than the small multiple type roller.

★ The drive chains are easily adjustable and are located back under the crawler treads where they can not come in contact with obstructions of any kind.

★ The self-cleaning principle of the drive rollers, prevents mud and dirt from interfering with the propelling mechanism, thus assuring smooth, trouble-free travel at all times.

★ Extensions can be applied to the standard crawler to increase the ground bearing area and effect greater stability when machine is working on soft, uneven ground. Extensions can be applied in the field.

★ Each tread is hinged across the full width on heavy steel pins passing through multiple lugs.

Regardless of the position of the crawler belt, either crawler belt can be disengaged for turning in a wide or short radius.

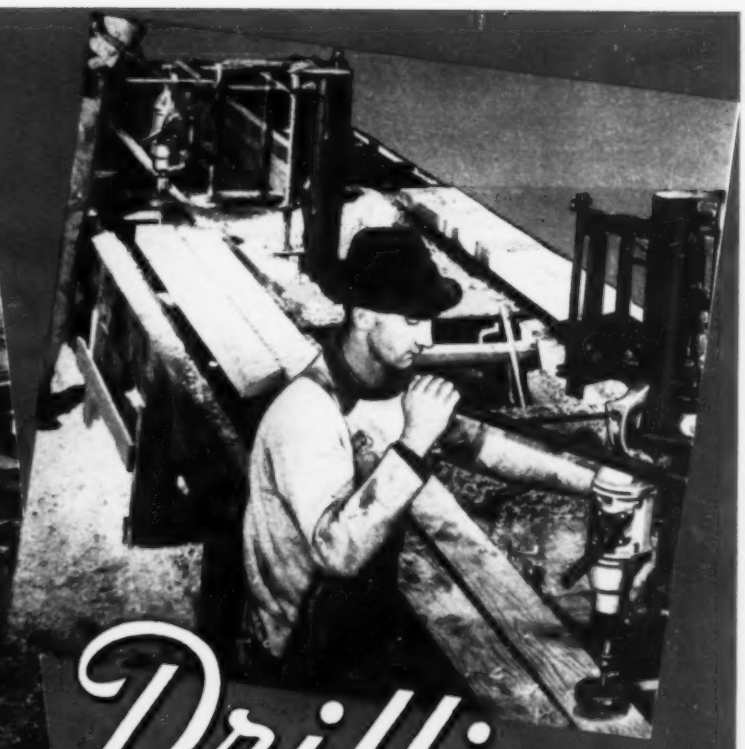
The crawler truck is equipped with an efficient truck lock that prevents the machine from working back when machine is digging or working on a grade.

The LIMA crawler truck is designed for earthmovers who can not tolerate travel delays. It is strong and rugged, with speed and flexibility to enable it to master any ground condition a shovel, dragline, or crane may encounter. Make your next excavator a LIMA. You will like its ruggedness and speed and the way it can be maneuvered over rough, uneven ground and in close quarters.

LIMA LOCOMOTIVE WORKS, Inc.

Shovel and Crane Division — LIMA, OHIO

NEWARK, N.J. NEW YORK, N.Y. DALLAS, TEXAS PORTLAND, ORE. SEATTLE, WASH. SPOKANE, WASH. SAN FRANCISCO, CALIF. LOS ANGELES, CALIF. PHILADELPHIA, PA. MEMPHIS, TENN. MONTREAL, QUEBEC, CANADA



Sawing Drilling Nut Running

goes FASTER, EASIER
with
Black & Decker Tools

Sawing and notching . . . drilling and boring . . . nut running and screw driving—important jobs that must be done *fast* on today's big war construction projects. And husky, time-saving Black & Decker Electric Tools *do them fast* . . . and better, too. In these days of labor scarcity and almost impossible demands on construction schedules, big scale builders have found that Black & Decker Tools are practically indispensable on all war jobs.

Here's Why Contractors Prefer the Help of B & D Tools

SAVE TIME ON ALL JOBS
SEND FOR FREE HANDBOOKS

These books show ways Black & Decker Tools can speed up your jobs. Check the ones you want and send for your FREE copies today.

- ☐ SAW HANDBOOK
- ☐ HAMMER HANDBOOK
- ☐ GENERAL TOOL CATALOG

- Because Black & Decker Tools can be bought *on the job* from leading distributors in all principal cities.
- Because Black & Decker Tools do *more* work *faster* . . . require less man-power to do the job.
- Because Black & Decker Tools are easy to use . . . easy for new men to "learn on" . . . easy to "get the feel of."
- Because Black & Decker makes a *powered-right* tool for almost every job . . . *right* size, *right* capacity.
- Because 26 Black & Decker factory branches, located coast to coast, provide quick, efficient service on repairs or replacements, when necessary.

Your nearby distributor can help you with your tool requirements. Ask him. The Black & Decker Mfg. Co., 759 Penna. Ave., Towson, Md.

GET IN THE SCRAP WITH YOUR SCRAP

LEADING DISTRIBUTORS EVERYWHERE SELL

Black & Decker

PORTABLE ELECTRIC TOOLS

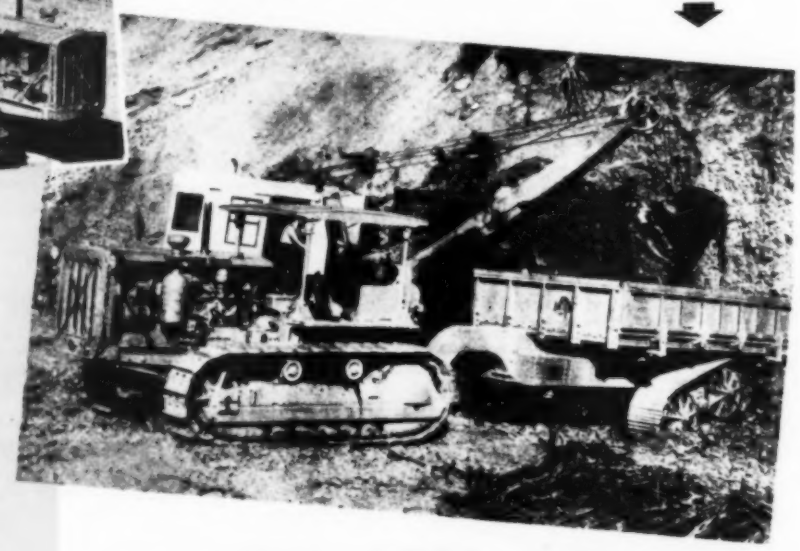
Military Strategy Calls for Athey Trailers in Preparing the

Groundwork FOR FUTURE ACTION

In England, with a fleet of Athey Trailers and "Caterpillar" Diesels on a giant earth-moving project.

Here, 16-yard Athey Trailers handle big loads of heavy rock. They're on the job day after day, constructing an airport on the eastern seaboard.

Hurrying the building of a highway in New Zealand. Athey Trailers are highly maneuverable for getting into, and out of, crowded quarters.



Before planes can fly . . . mechanized armies can move, or troops can be quartered, careful preparations have to be made. Advance groundwork is essential to military strategy. The construction of highways for swift movement of men . . . airports for bombers and fighter planes . . . encampments for barracks . . . these are preparatory assignments vitally necessary in today's battle planning. Athey Trailers insure completion of these jobs regardless of weather and ground conditions. These all-weather units have brought hauling stability and dependability to the world-wide allied fronts. Meeting this demand for Athey Trailers, even with greatly increased production facilities, has made it impossible for us to fill our regular customer's requirements.

ATHEY TRUSS WHEEL CO., CHICAGO, ILL.

ATHEY

FORGED-TRAK TRAILERS

To Help Speed Victory — Buy War Bonds!

On a Sunday morning twelve months ago, America got out of bed and yawned and breakfasted, went to church and read the funnies or took a walk with the kids. We were a big, sleepy, good-natured people who only half believed that such things as war existed.

A few hours later we were awake. The thing that made us awake was treacherous and brutal, but the shock of it was as bracing as an icy shower. We knew, at last, where we stood and what we had to do.

THAT WAS A YEAR AGO...

You have a broad idea of what the nation has accomplished in this first year of war. We now report to you on what the men of one company have done and are doing.

Long before last December, "Caterpillar" Diesel Tractors and Motor Graders, Engines and Electric Sets were busy on what was then called "defense" work. With the country's entry into war, "Caterpillar" production was turned wholly to war purposes, and our plants, already working three shifts a day, stepped up their output of machines. Additional space was built. More workers were trained.

Throughout this crucial year, 100 per cent of this increased "Caterpillar" production has been going into the war effort—the vast majority of it directly to the *combat forces* of the Army, Navy and Marine Corps, and for our fighting allies. On all the world's battlefronts these machines are in the thick of the struggle for freedom. "Caterpillar" Diesel equipment is clearing beach-heads for attack troops, hauling big guns, building and repairing landing fields, drilling wells and pumping water. It is powering naval craft and generating current for lights and communications, afloat and ashore. But our report would be far from complete if it dealt only with combat activities. Here at home, thousands of older "Caterpillar" machines have been performing what appears to be a miracle. With no new machines coming from the factory to replace them—with fewer men to do the vital wartime jobs, and with heavier loads and longer hours a necessity—they have stood up under grueling punishment, month after month. In industry and construction, in mines and lumber camps and on the farms, "Caterpillar" Diesels are making a mighty contribution to the war effort.

They're no orphans—these tough, veteran machines. They are under able and expert guardianship. Back of their record of performance stand the "Caterpillar" dealers who have met the challenge of this emergency with energy and courage, and have shouldered full responsibility for keeping "Caterpillar" Diesel equipment doing its sturdy best.

With a large supply of replacement parts, and with complete service facilities available night and day, "Caterpillar" dealers everywhere are pledged to keep "Caterpillar" Diesel Tractors, Graders, Engines and Electric Sets delivering all of the long life and dependability that are built into them.

CATERPILLAR DIESEL

REG. U.S. PAT. OFF.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

TO WIN THE WAR: WORK — FIGHT — BUY U. S. WAR BONDS!

"Economical Operation ...netted us dividends ...thanks to RING-FREE"

SHAFFER & MAX
Silk Waste, Remnants • Textile Machinery
ALLENTOWN, PA.

R.J. Prite Co.
710 E. ...ington St.
Allentown, Pa.

Gentlemen:

Our fleet of equipment consists of eight tractors and five passenger cars. Our tractors pull heavy loads of machinery from Allentown, Pa., to Florida and as far north as Province of Quebec, Can. The first experience we had with Ring-Free Oil convinced us that this was the oil for our equipment.

On our trips to Canada, during the winter months at 30 degrees below zero, with other oils, we had to tow the tractors to start the engines, which cost us $5.00 per tow each morning until we were asked to use Ring-Free Oil. To our amazement we were able to start the engines after that with the starters. This immediate saving was the start of an economical operation which has netted us dividends ever since.

All of our equipment is now lubricated by Ring-Free. Thanks to Ring-Free.

Sincerely yours,
Shaffer & Max
Lorraine Manger
O. Casciotti

"At 30° below, with other oils, had to tow the tractors to start the engines."

THE EIGHT TRACTORS in the Shaffer & Max fleet must haul heavy textile machinery from Allentown, Pa., as far south as Florida and as far north as Quebec.

"On our trips to Canada," writes O. Casciotti, service manager, "during the winter months at 30 degrees below zero, with other oils, we had to tow the tractors to start the engines, which cost us $5.00 per tow each morning until we were asked to use RING-FREE.

"To our amazement we were able to start the engine after that with the starters. This immediate saving was the start of an economical operation which has netted us dividends ever since. All of our equipment is now lubricated by RING-FREE."

What RING-FREE has done for others, it can do for you. Write us!

MACMILLAN PETROLEUM CORPORATION
50 West 50th Street, New York • 624 South Michigan Avenue, Chicago • 530 West 6th Street, Los Angeles

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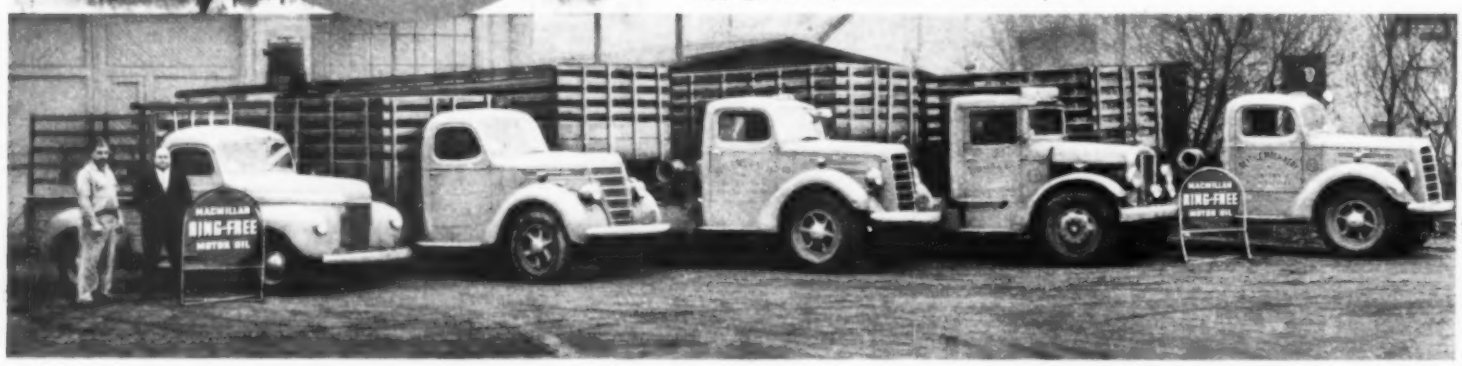
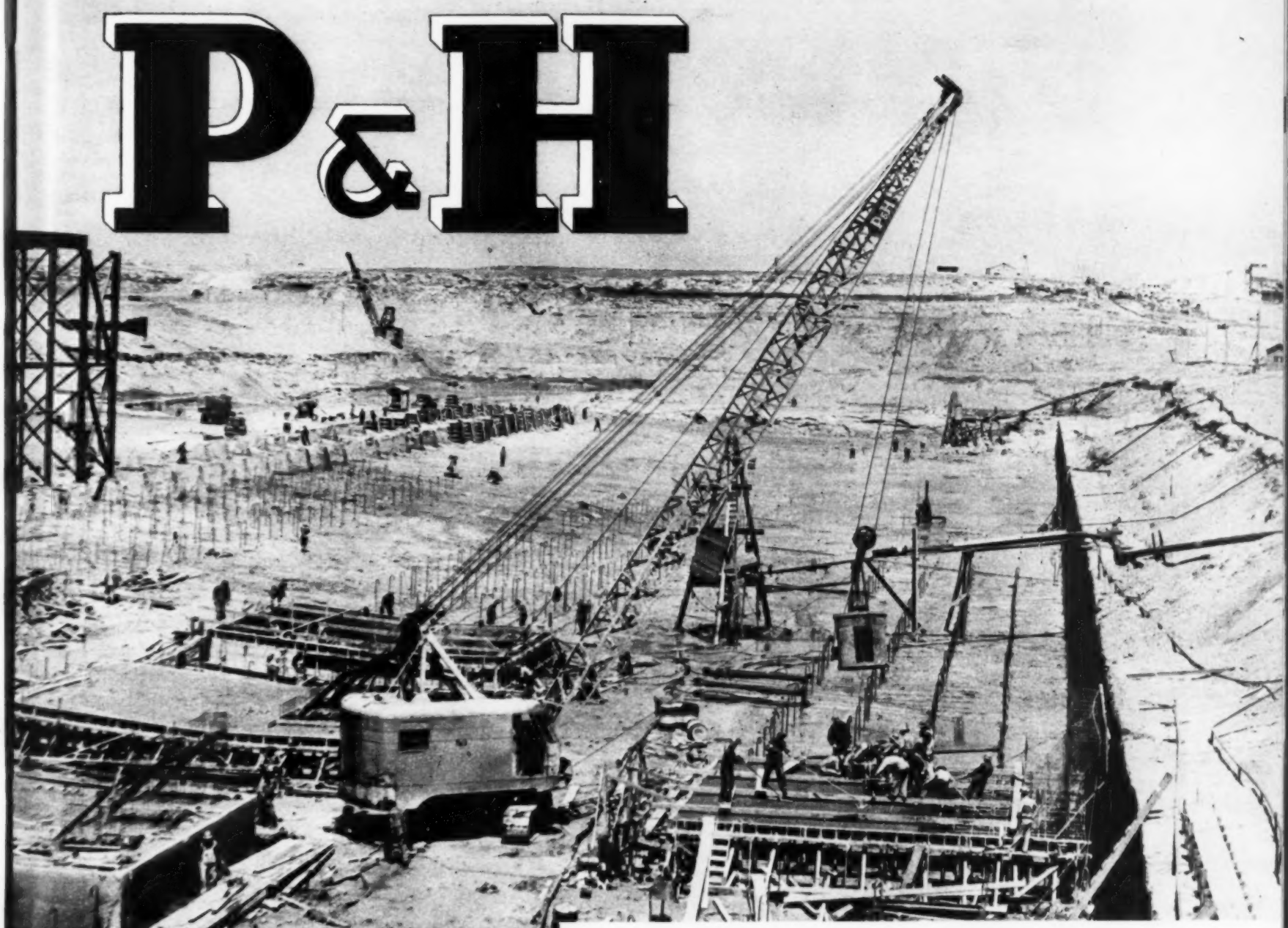


P&H



LUBRICATE THOROUGHLY AND *Often!*

MAKE your machine last longer with proper care. Your oiler should grease all accessible fittings, safe from moving parts, while machine is in operation. Have him work while the operator eats. Keep grease guns filled and in good order — oils handy in tightly closed containers.

Protect the big advantages you have in P&H construction of welded rolled alloy steels, triple-safe planetary boom hoist and automotive hydraulic control. Negligence of this highly productive equipment is almost treason.

NOW

NEGLIGENCE IS ALMOST TREASON!

Awarded the Navy "E" for excellence in war production, P&H displays it also as a pledge of future effort.

General Offices: 4494 West National Avenue, Milwaukee, Wisconsin

HARNISCHFEGER CORPORATION

EXCAVATORS • ELECTRIC CRANES • ARC WELDERS P&H HOISTS • WELDING ELECTRODES • MOTORS

SPEAK FOR YOURSELVES, *Gentlemen!*

I saved a whole week by using Atlas High-Early for floors at the Henderson Produce Company
The contract didn't call for it—but we used Atlas High-Early on a housing project for stair treads to save form lumber
We placed an Atlas High-Early floor at CENSORED about 4:30 P. M. Next morning they had up to 1,600 lbs. of steel per sq. ft. on it. Quick work!

All Atlas High-Early jobs are kin under the surface— they're fast and they save you money

These three short stories speak for themselves:

1. Machinery on floor before building completed. The Henderson Produce Company in Monroe City, Mo., had to build an addition to their plant in order to separate and dry eggs for shipment. *Speed was essential.* The contractor used Atlas High-Early cement for the floors and estimated one week's saving in time. He was able to place machinery on the floors before the building was finished. The addition was in operation in 60 days!

2. Running up the stair treads—fast! Even though the contract did not call for it, the contractor for the stair treads in a Cincinnati Housing Project used Atlas High-Early. He wanted to speed up the job and save lumber for forms. And he did. Use of Atlas High-Early cement instead of normal portland cement permitted removal of forms from treads in one-half the time. The job went faster and form costs were lower!

3. Storage room floor made ready overnight. A new plant at ——— needed a floor—on the double quick! Engineers and contractor decided on Atlas High-Early cement. The last concrete was placed about 4:30 P. M. At 8:30 the next morning, steel was being stored on it—as much as 1,600 pounds per square foot. This use of Atlas High-Early saved at least four or five days on an important war job.

★ ★ ★

Speed with economy is the reason why Atlas High-Early cement is specified and used so much today—speed in completing defense housing, cantonments, roads, airports, war production plants.

On almost any kind of concreting job where "Rush" is a must, rely on Atlas High-Early. In application, it's like normal portland cement and just as easy to handle. Universal Atlas Cement Company (United States Steel Corporation Subsidiary), Chrysler Building, New York City.

OFFICES: *New York, Chicago, Philadelphia, Boston, Albany, Pittsburgh, Cleveland, Minneapolis, Duluth, St. Louis, Kansas City, Des Moines, Birmingham, Waco.*

CM-H-48

ATLAS HIGH-EARLY CEMENT

A UNIVERSAL ATLAS PRODUCT

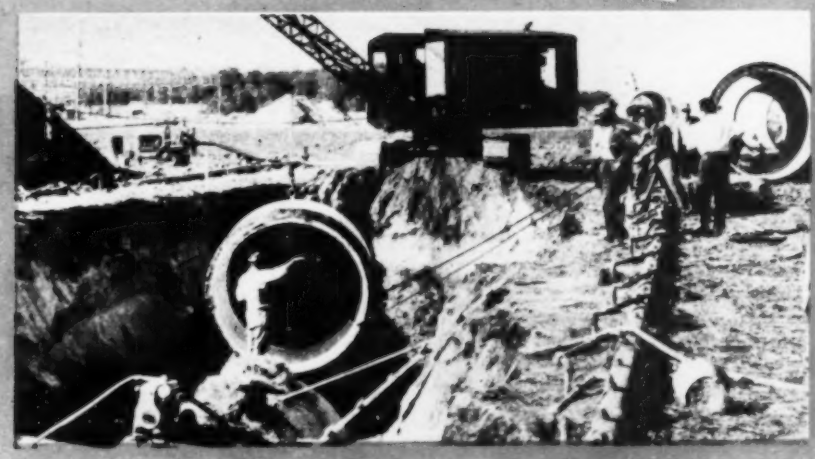
OVER 100 UNITS of JAEGER EQUIPMENT speed building and paving of Ford Bomber Plant and its Access Roads!

Jaeger High Speed Finishers Completed 63 Miles of 20 Ft. Runways in 42 Days — are Finishing Over 13 Miles of 2 to 6 Lane Access Highways to Handle 1400 Vehicles per Lane per Hour.

24 Jaeger Truck Mixers (3 and 4 Yd. Sizes) Poured Over 200,000 Cu. Yds. of Concrete for Bomber Plant Buildings and Foundations at 215 Cu. Yds. per Hour . . . 18 Jaegers Poured All Concrete for the 11 Grade Separation Structures on Access Roads.

Use of These Mobile Mixing Plants Solved Placing Problems, Maintained Steady High Production.

74 Jaeger "Sure Prime" Pumps in 1½" to 6" Sizes, Plus Jaeger Well Points, Met Numerous De-Watering Problems. Photo Shows Pre-Draining 1800 Ft. Trench 17 Ft. Below Ground Water Level.



DISTRIBUTORS EQUIPPED FOR SERVICE IN OVER 100 CITIES

THE JAEGER MACHINE COMPANY

800 Dublin Avenue, Columbus, Ohio, U. S. A.

A whole year's tips on a handy tag...
TO GO WHERE IT'S NEEDED MOST

ALL THROUGH 1942, our advertising has brought you much valuable information on how to install wire rope, how to maintain and inspect it, how, in brief, to make it last as long as possible.

Many of you executives and operating men have expressed a desire to pass along this information in simple, handy form to your men who really handle the rope, so they'll be able to use it right on the job.

Here they are—a whole year's tips on wire-rope conservation — on a sturdy, convenient tag you can have fastened right to equipment, on controls, or to the wire rope itself.

Printed on heavy stock and varnished for further protection, the tags are ideal for use right on the job — durable, washable, always legible. And they're yours for the asking! *WRITE FOR "TAG A".*

JOHN A. ROEBLING'S SONS COMPANY
TRENTON, NEW JERSEY
Branches and Warehouses in Principal Cities

★ PROMPT SERVICE
★ on essential orders from warehouse
★ stocks or mill

ROEBLING
"Blue Center"
STEEL WIRE ROPE
PREFORMED OR NON-PREFORMED

CALLING *ALL* CONTRACTORS AND OPERATORS!

Enlist

TO CONSERVE CONSTRUCTION EQUIPMENT

Show others that you are helping to make your equipment last longer and work faster. Regardless of the type or make of your equipment, if you will sign and mail the pledge form below, we will send you a colorful red, white and blue emblem to put on your machine (or it can be used on a truck or passenger car). Then it's up to you to practise what you have pledged—it's one big way you can contribute to victory.

Get This Emblem Sign This Pledge

New Emergency **"FIX-IT"**

HANDBOOK for LORAIN OWNERS

To assist our customers in keeping their machines in operation, we have just prepared a 24-page handbook of suggestions and ideas on how emergency repairs may best be accomplished. Indicate on the pledge form if you want us to send you a copy.

THEW CENTER DRIVE

THE THEW SHOVEL COMPANY, *Lorain, Ohio*

I hereby pledge that I shall do all in my power to prolong the life of any construction equipment in my ownership or care regardless of type or make.

I realize that it is my responsibility to avoid time-consuming delays caused by mechanical breakdowns and will see that frequent inspections are made and that necessary adjustments and repairs are promptly taken care of.

I will avoid waste of parts and materials and will eliminate any abuse of my equipment due to non-recommended operation.

Signed _____

Street Address _____

City _____ State _____

"FIX-IT" Handbook Wanted _____

Lorain Model No. _____ Serial No. _____

Don't let cold weather hold *you* up, either . .

With Lehigh Early Strength Cement you can go ahead, full-speed, on needed concrete work

Now is no time to let cold weather interfere with building operations. The war is still on; necessary construction must proceed, full-speed.

As the picture shows, winter-time jobs *can* go forward—by the use of Lehigh Early Strength Cement. For with this cement, concrete comes to service strength in ⅓ to ⅕ the usual time. The danger of frost damage is *lessened;* heat-protection time is *cut*, its cost *reduced* . . .

. . . and, besides giving you winter concrete at summer speed, your use of Lehigh Early Strength Cement cuts forms cost, coordinates construction schedules, permits earlier occupancy, helps meet contract obligations—*any time of year.*

The Lehigh Service Department will send you, free on request, data on the practices recommended for cold weather concreting with Lehigh Early Strength Cement. You are invited to send for this helpful information.

Lehigh

EARLY STRENGTH CEMENT

for service-strength concrete in a hurry

LEHIGH PORTLAND CEMENT COMPANY • ALLENTOWN, PA. • CHICAGO, ILL. • SPOKANE, WASH.

Side view during fabrication

My hat's off to Heil engineers! Their all-welded Hi-Speed Scoop gets rid of dead weight and moves twice as fast— with longer service life and less service trouble

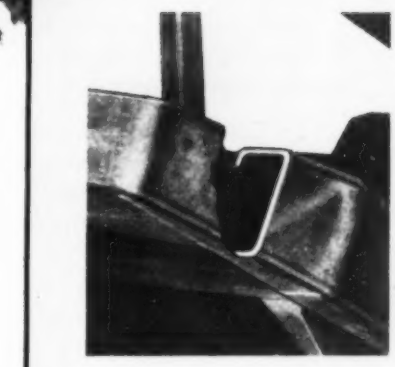
"The fast performance of this Hi-Speed Scoop is something you can't argue with. Mister, it's there! When you can handle twice as much dirt in the same number of hours with a unit of the same size (compared with unit drawn by crawler tractor), you've really got something.

"But how does she stand up? Sure, you've got to know that. And it's right there that modern welding seems to work miracles, when the engineers know their stuff. Take a section almost anywhere — and you find *increased strength* in the Heil Hi-Speed Cable Scoop, compared with the old-style heavyweights . . . "And when you do have to take care of the wear-and-tear that's part of heavy construction work, there's no sitting around waiting for steel castings, because Heil design uses fabricated parts in place of steel castings. You *weld* 'em, then and there — and go back to work."

★ ★ ★

It was natural that Heil — a plate shop for years and a pioneer in welding — should go all the way in applying all-welded construction to dirt-moving machinery. This achievement was recognized by one of the highest awards in Lincoln Electric's national contest on welding applications going to a Heil engineer. You win too, with Heil Hi-Speed Cable Scoops — win greater profits with less trouble, and a reputation for fast, dependable performance. Select this all-welded equipment whenever available.

R-5



Box section design assures maximum strength with minimum weight. Due to this design, section can readily be increased or decreased in relation to the stress carried at that point.

THE HEIL CO.

GENERAL OFFICES • MILWAUKEE, WISCONSIN

HEIL ANSWERS UNCLE SAM'S CALL

. . . and helps the Arsenal of Democracy supply materials for Victory!

WHY CORROSION SHORTENS THE LIFE OF WIRE ROPE
HOW SHEAVE MATERIALS AFFECT WIRE ROPE SERVICE
How you can lengthen wire rope life BY PROPER SHEAVE MAINTENANCE
The Importance of an Adequate Safety Factor For Your Wire Rope
How thorough lubrication lengthens the service life of wire rope
Correct rope reeving saves wire rope dollars...
HOW TO GET INSPECTION SAVES WIRE ROPE DOLLARS
Select The CORRECT Wire Rope For Your Equipment—Save Time and Money
3 ways to make your Wire Rope dollar go further...conserve steel tonnage too
CORROSION IN WIRE ROPE
PROTECTING WIRE ROPE AGAINST CORROSION
LUBRICATE
MONARCH
WIRE ROPE
PRACTICAL METHODS OF LUBRICATING YOUR WIRE ROPE

WIRE ROPE *Conservation Bulletins*

SENT ON REQUEST

We pause in this series of informative articles for wire rope users to review briefly the 12 thus far published . . . and provide an opportunity for those who may not have seen them to obtain reprints.

The purpose of this series of single-page illustrated articles on wire rope conservation is to help you conserve your wire ropes. This helps you, and helps our country for it means conservation of steel. We shall be glad to send you any or all of the articles listed below which readers tell us are useful and helpful.

1 ***Why Corrosion Shortens the Life of Wire Rope.*** Tells cause, effect, and suggests remedy for corrosion. Also explains how proper lubrication helps wire rope stand up against elements.

2 ***How Sheave Materials Affect Wire Rope Service.*** Pictures effect of hard and soft sheaves on wire rope. Explains what to watch for, how to avoid rope and sheave damage.

3 ***How You Can Lengthen Wire Rope Life by Proper Sheave Maintenance.*** Includes handy reference table on groove tolerances. Also points out 3 ways to save wire rope dollars.

4 ***The Importance of an Adequate Safety Factor.*** What is it? How Found? When is wire rope overloaded? What are minimum safety factors for various loads? All are answered in this easy-to-read, informative article.

5 ***How Thorough Lubrication Lengthens Service Life of Wire Rope.*** Explains two lubricating methods. Shows effect (Pictures) of ropes left unprotected.

6 ***Correct Rope Reeving Saves Wire Rope Dollars.*** Discusses fleet angles, reverse bends, rope spooling and what to do about them.

7 ***Regular Inspection Saves Wire Rope Dollars.*** Lists 6 common causes of wire rope failure. All can be avoided if rope user follows simple inspection procedure suggested.

8 ***Select the Correct Wire Rope for Your Equipment—Save Time and Money.*** Explains how Flexibility, Abrasion Resistance, and Strength are determined to meet varying conditions of Bending Fatigue, Abrasive Wear, and Loading Stress.

9 ***3 Ways to Make Your Wire Rope Dollar Go Farther—Conserve Steel Tonnage Too.*** Especially valuable to men actually handling wire rope.

10 ***Corrosion in Wire Rope.*** Gives further information on how to combat this rope destroyer. Supplements informative article number 1.

11 ***Protecting Wire Rope Against Corrosion.*** Shows some results of forgetting to inspect and protect wire rope with proper lubrication.

12 ***Practical Methods of Lubricating Your Wire Rope.*** Illustrates simple ways to lubricate your wire rope on the job. Very practical, useful for everyone concerned with wire rope care.

MACWHYTE COMPANY Manufactures:

- MACWHYTE PREformed and Internally Lubricated Wire Rope
- MONARCH WHYTE STRAND Wire Rope
- MACWHYTE Special Traction Elevator Cable
- MACWHYTE Braided Wire Rope Slings
- MACWHYTE Aircraft Cables and Tie Rods

MACWHYTE COMPANY, 2940 Fourteenth Ave., Kenosha, Wis. • *Mill Depots:* New York • Pittsburgh Chicago • Ft. Worth • Portland • Seattle • San Francisco • *Distributors throughout the U. S. A.*

NO. 646

How to get them

Just circle those you wish and attach coupon to, or write on, your business letterhead.

Macwhyte Company
2940 Fourteenth Ave.
Kenosha, Wisconsin

1 2 3 4 5 6
7 8 9 10 11 12

I would like reprints of informative articles on wire rope conservation which you have published recently. I have circled those I wish.

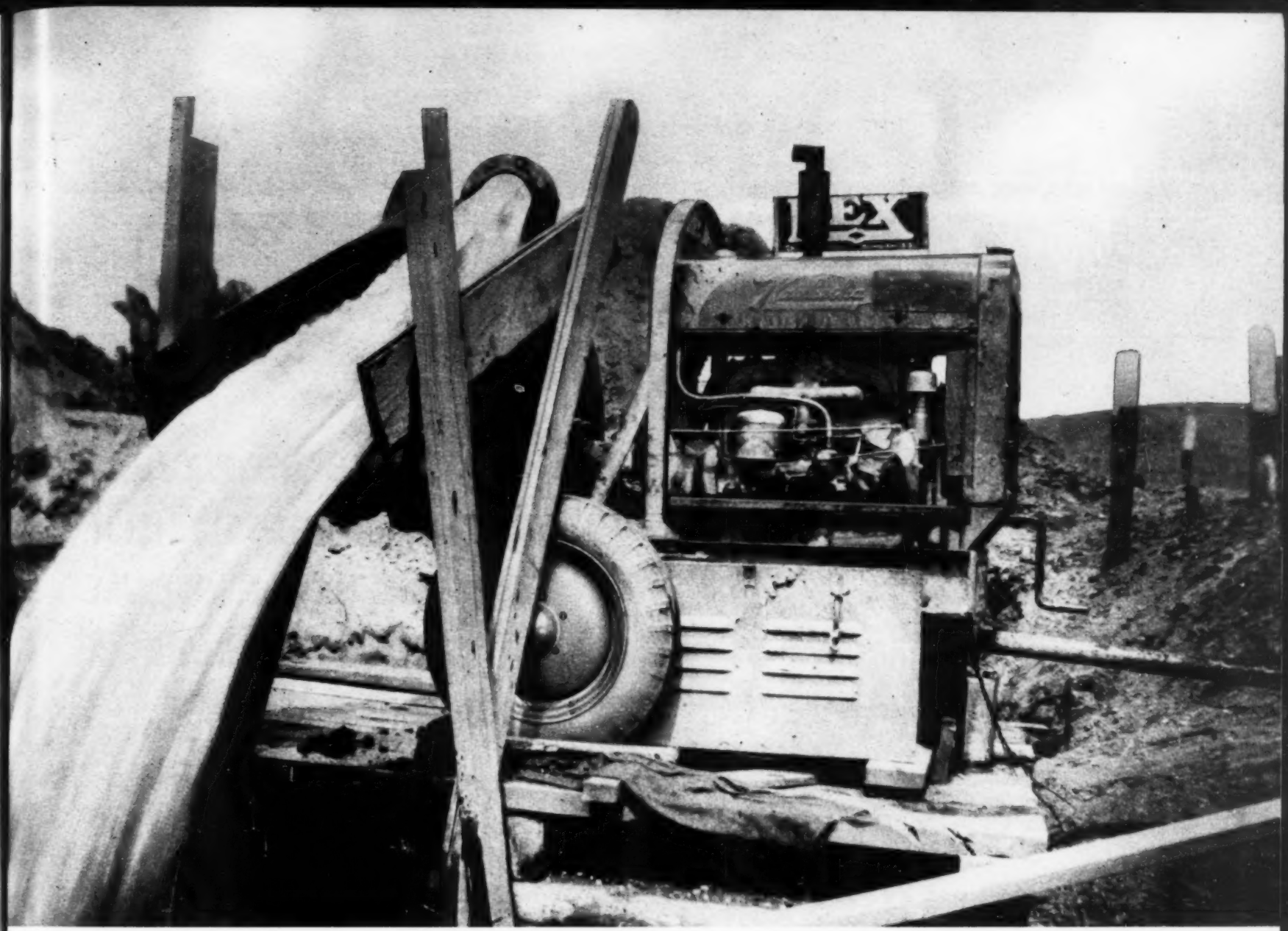
Name _____

Title _____

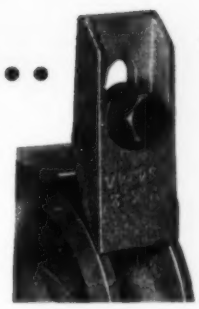
Company _____

Co. Address _____

City _____ *State* _____



THESE PUMPS CARRY KNIVES... to Peel Air!



There is a pump that can prime as much as 50% faster than others—and operate efficiently in the face of leaks that would stop ordinary pumps. It's the Rex Speed Prime Pump with the exclusive, patented Rex Air Peeler.

WITH a Rex Speed Prime Pump you "start the motor and forget the pump." You have no worries about priming or re-priming, no concern about fluctuation in the volume of water being handled. Rex, thanks to the revolutionary Air Peeler, moves all the volume all the time.

The Air Peeler is a sturdy knife-edged blade of Rex Z-Metal, mounted directly above the Rex impeller. During the priming operation, air is forced to the outside of the impeller vanes—literally peeled from the impeller just as you would peel an apple. Then this air escapes through the discharge opening which greatly accelerates the pump's priming time.

Of course, this is just one of the exclusive features that have made Rex Speed Prime Pumps famous in the construction industry. Other reasons—and a showing of the full Rex line from the amazing 57-lb. Rex Jr. 3-M to the big 125-M type—are given you in "Facts You Should Know About Rex Speed Prime Pumps."

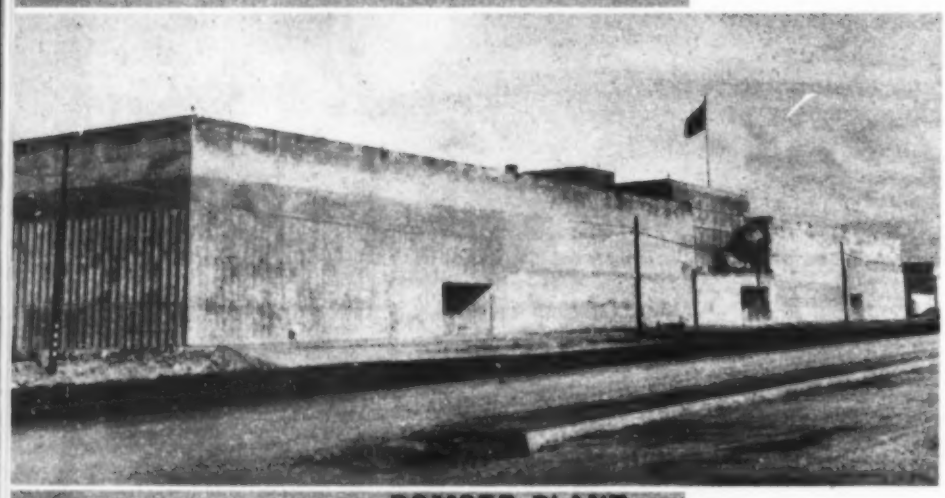
Write for Bulletin 400. Chain Belt Company, 1664 West Bruce Street, Milwaukee, Wisconsin.

REX SPEED PRIME PUMPS

CHAIN BELT COMPANY OF MILWAUKEE

Millions of Yards
POZZOLITH . . .

SMALL ARMS PLANT



BOMBER PLANT

ALUMINUM PLANT

41 GREAT DEFENSE PROJECTS PART OF IMPRESSIVE LIST SHOWING NATIONWIDE USE OF POZZOLITH . . .

4 SMALL ARMS PLANTS

8 GIANT AIRCRAFT PLANTS

6 ALUMINUM PLANTS

8 SHELL LOADING PLANTS

9 ORDNANCE DEPOTS

3 ATLANTIC BASES

3 SHIPYARDS

MASTERBUILT PRODUCTS

MASTER

of Concrete....

...CEMENT DISPERSION

LEADING BUILDERS ARE USING POZZOLITH (CEMENT DISPERSION) TO GAIN THESE VITAL ADVANTAGES...

√ *FASTER WINTER CONSTRUCTION . . .*

3 day strength in 1 day—28 day strength in 7 days using High Early Pozzolith with regular portland cement. Earlier form removal and fewer required.

√ *LOWER COSTS . . .*

Lower total materials cost.
Less man-hours — placing, finishing.
Period of heat protection cut 50%.

√ *CONSERVE STEEL . . .*

Higher strength concrete at all ages.

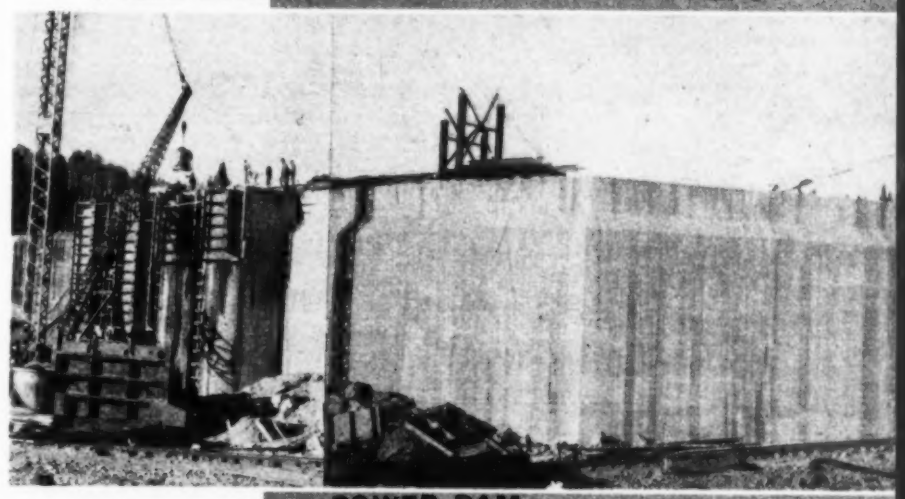
√ *BETTER CONCRETE . . .*

Resistance to freezing and thawing increased 50%; watertightness increased 20%; segregation decreased.

Write for illustrated Pozzolith booklet and Research Papers No. 36—"Economics of Cement Dispersion" (for mass concrete) and No. 39—"Cement Dispersion and Air Entrainment" (for runways and pavement).

THE MASTER BUILDERS COMPANY
CLEVELAND, OHIO TORONTO, ONTARIO

SHELL LOADING PLANT AND STORAGE DEPOT



POWER DAM

AIRCRAFT PLANT

BUILDERS

MASTERBUILT PRODUCTS

GO-GETTER

THIS sturdy, go-getting war worker is a 6 x 6 (6-wheel-drive) mobile crane built for the U. S. Armed Forces by the Thew Shovel Company.

The front and rear driving axles and transfer cases are by Timken.

Mobile cranes of this and similar types are U. S. war workers of the first order. They "go" under their own power . . . over any terrain . . . on or off the road. And then, when they get there, they get heavy lifting jobs done in a hurry—on construction projects, on ship loading docks, on a thousand and one other jobs where the Armed Forces require brute lifting power combined with unlimited mobility.

Here's a picture of toughness! This photograph was taken to show you the sturdy Timken Double Reduction Driving Axles, front and rear, on a Lorain 6 x 6 mobile crane. The Transfer Case (gear box that splits the torque between driving wheels and provides an extra range of transmission speeds) is built by Timken, too. In war as in peace, wherever toughness counts, Timken Axles are the Accepted Standard!

ARMY (E) NAVY

TIMKEN AXLES

THE TIMKEN-DETROIT AXLE CO., DETROIT, MICH.
WISCONSIN AXLE DIVISION, OSHKOSH, WIS.
Timken: Builder of Battle Axles

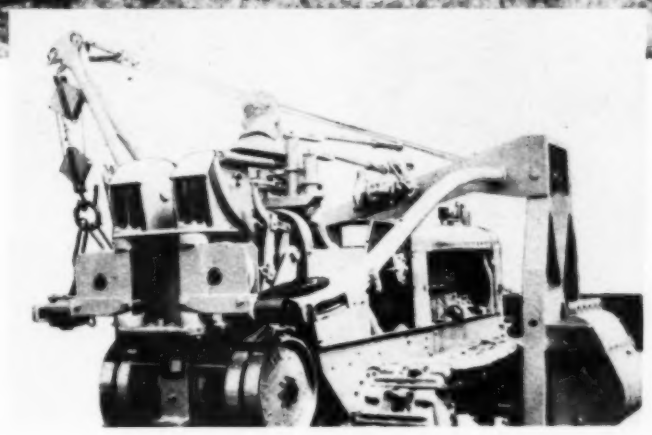
Axle Maintenance is more important than ever now. Write for Timken's free A.M. aids.

TIMKEN AXLES DA

ANOTHER JOB MADE *Easy!*

With BUCKEYE CABLE CONTROL, YOUR TRACTORS CAN DO MORE JOBS!

by BUCKEYE CABLE CONTROL



FASTER, easier, lower cost handling of pipe—that's what the Ohio Oil Company secured when they designed and built the rig illustrated. A double drum medium heavy duty Buckeye Power Control Unit made it possible, provided fast, powerful, smooth Cable Controlled operation.

Buckeye Hoists are the logical choice for a job like this. With a Buckeye single or double drum hoist you have one or two lines instantly available for operating dozers, scrapers, rippers, pavement breakers, for hoisting and elevating, pulling out stumps, towing, pulling cable through conduits and for 101 other jobs as well. They make handy men of your tractors, broaden their range of uses so that you can do more jobs, speed up operations and release manpower.

Smooth, cushioned clutch and brake action, cool operation, fingertip control, instantaneous response, ruggedness and dependability are a few of the features Buckeye Hoists offer. Write today for full information and prices on the models for your tractors. You'll be glad you did.

Ask for data on Buckeye UNITILT Bulldozers, Trailbuilders and Pushdozers

•

BUCKEYE TRACTION DITCHER COMPANY
Findlay • Ohio

•

Built by **Buckeye**

Convertible Shovels

Trenchers

Tractor Equipment

R-B Finegraders

Road Wideners

Spreaders

Full Capacity

...when valves stay clean

OPERATING on rush war work, your compressors can *still* deliver full capacity . . . when valves are kept carbon-free with *Texaco Alcaid, Algol* or *Ursa Oils.*

Free from elements that form gum, sludge and hard carbon, these Texaco Oils assure clean valves, open ports, longer service between inspections and overhauls.

The outstanding performance that has made Texaco preferred in the fields listed below has made it preferred on prominent construction jobs throughout the country.

These Texaco users enjoy many benefits that can be yours. A Texaco Automotive Engineer will gladly cooperate . . . just phone the nearest of more than 2300 Texaco distributing points in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York, N. Y.

Photo courtesy U. S. Bureau of Reclamation

THEY PREFER TEXACO

★ More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.

★ More locomotives and cars in the U. S. are lubricated with Texaco than with any other brand.

★ More revenue airline miles in the U. S. are flown with Texaco than with any other brand.

★ More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.

★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

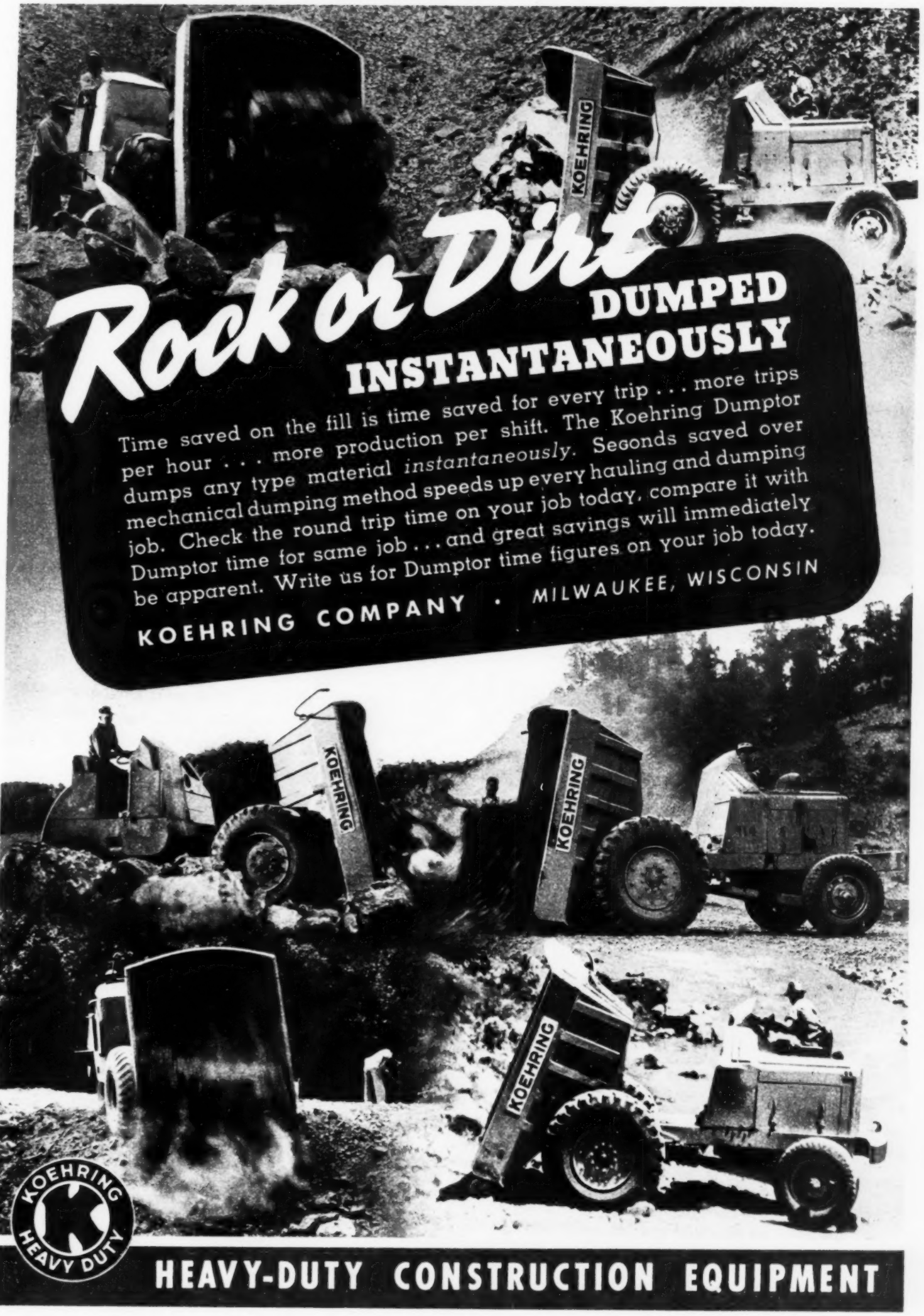
TEXACO Lubricants and Fuels

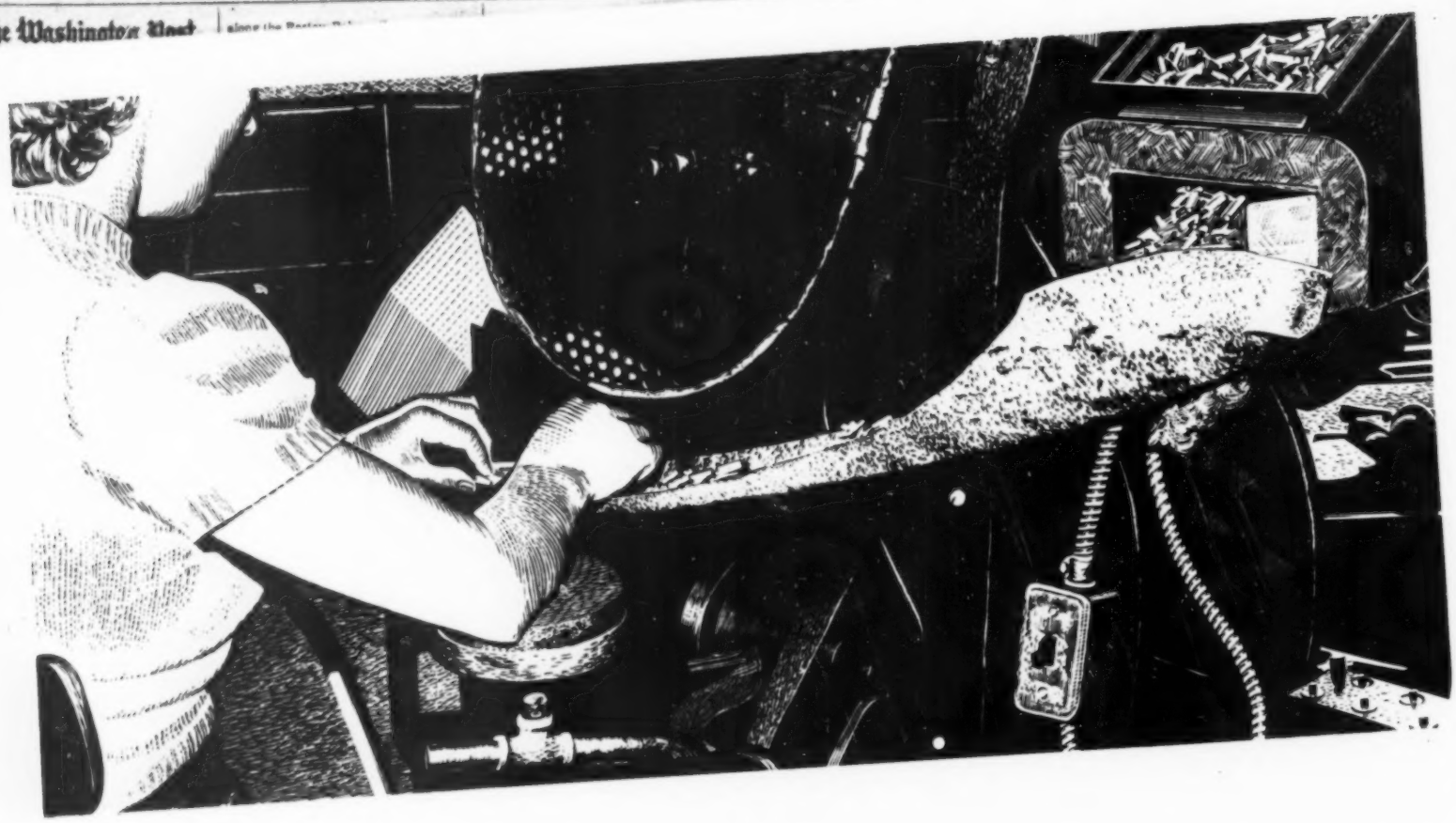
FOR ALL CONTRACTORS' EQUIPMENT

TEXACO

REG. T.M.

TUNE IN FRED ALLEN EVERY SUNDAY NIGHT — CBS ★ HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY


KOEHRING
Rock or Dirt
DUMPED
INSTANTANEOUSLY
Time saved on the fill is time saved for every trip . . . more trips per hour . . . more production per shift. The Koehring Dumptor dumps any type material *instantaneously*. Seconds saved over mechanical dumping method speeds up every hauling and dumping job. Check the round trip time on your job today, compare it with Dumptor time for same job . . . and great savings will immediately be apparent. Write us for Dumptor time figures on your job today.
KOEHRING COMPANY · MILWAUKEE, WISCONSIN
KOEHRING
KOEHRING
KOEHRING
KOEHRING
HEAVY DUTY
HEAVY-DUTY CONSTRUCTION EQUIPMENT



How Sally used up a copper mine

LOOK at the picture carefully. See that elbow-rest under Sally's arm?

It is significant. In fact, it's a humble sermon on war production.

Understand the existence of that arm-rest and you understand one of the basic reasons why, in less than seven months after war-conversion, American industry is hollering for Washington to provide more copper and other basic raw materials.

► Before Sally got her arm-rest, she reached over to a box, picked up a tiny part for an airplane instrument and placed it in the machine . . . Now the supply box is tilted and constantly jiggled, so that the parts flow to her finger-tips. With each motion Sally saves a fraction of an ounce of energy and half a second of time.

Without such tiny savings of time and effort, America's 20,000,000 factory workers would be hopelessly handicapped in their race against the millions at work with a head-start of years in Germany, Japan and Italy.

► The muscle-misers and second-savers of our factories come in handy in this war, when splitting seconds in production is as important as it is in battle.

Who are the men that provide the arm-rests, jiggle the supply-boxes, conduct the ceaseless hunt for wasted half-seconds and needless human motion?

► They are the "methods" men of industry. They have all sorts of titles: plant managers, operations managers, methods engineers, efficiency engineers, etc. But their job is "to manage men and machines to save time and materials."

In peace, these men were the core of the industrial system that gave you the world's highest living standard at the world's lowest cost in hours of work.

► In war, these same "methods-managers," with the intelligent cooperation of American workmen, are cutting years from our arming task by splitting seconds from its millions of individual operations. This example of time-saving is just an indicator of what a plant operating man does. Such men have many other jobs, including the important job of plant maintenance, but "second-splitting" is the field in which they are the envy of the whole world.

The American Production Manager is the product of the American industrial system. Complex, loose-jointed and aimless though our system may seem to the theorist, it meets every challenge, because it is the best system ever devised by man for discovering, developing and rewarding individual initiative.

Reprints of this advertisement are available in handy booklet form.

McGRAW-HILL PUBLISHING COMPANY, Inc.

330 WEST 42ND STREET • • NEW YORK

SALLY—

IS UP YOUR ALLEY!

WASHINGTON, and other large city newspapers were used for the advertisement shown opposite, because government and public need to understand the asset which America has in its trained industrial staffs.

Read what we said about "methods management" in the advertisement, then ask yourself the secret of American genius for production economies in men, materials and time.

One big advantage we have in this country is the interchange of know-how between industries. If an instrument maker reduces a fourth-class hand motion to third-class, all other managers of small part assembly can, and do, find out how it was done.

By means of the articles and advertisements in FACTORY,* a plant operations magazine, tens of thousands of plant operating men keep abreast of each new development in equipment and technique.

The magazines of the McGraw-Hill Network of Industrial Communication exist solely for swapping ideas. They are backed by the editors and engineer-correspondents, who gather information wherever it is developed, and funnel it out to the fields where it is needed.

So valuable is this interchange of technical information that many companies are surveying their organizations to make sure that the supply of Industrial Magazines is adequate.

If you would like suggestions as to how to conduct such a survey, just write to Reading Counselor Department, McGraw-Hill Publishing Company, Inc., 330 West 42nd Street, New York.

★ ★ ★

THE McGRAW-HILL NETWORK

23 publications, which gather "war-news" from the "war-production-front" through a staff of 153 editors and 725 engineer-correspondents... More than 1,500,000 executives, designers, production men and distributors use the editorial and advertising pages of these magazines to exchange ideas on war-production problems.

THE McGRAW-HILL BOOKS

Publishers of technical, engineering and business books for colleges, schools, and for business and industrial use.

McGRAW-HILL PUBLISHING COMPANY, Inc.
330 WEST 42nd STREET • NEW YORK

THE McGRAW-HILL NETWORK OF INDUSTRIAL COMMUNICATION:

*Factory Management & Maintenance—*SHOWS HOW TO MANAGE MEN AND MACHINES TO SAVE TIME AND MATERIALS*

American Machinist
Aviation
Bus Transportation
Business Week
Chemical & Metallurgical Engineering
Coal Age
Construction Methods
Electrical Contracting
Electrical Merchandising
Electrical West
Electrical World
Electronics
Engineering & Mining Journal
E. & M. J. Metal and Mineral Markets
Engineering News-Record
Food Industries
Mill Supplies
Power
Product Engineering
Textile World
Transit Journal
Wholesaler's Salesman

ALSO AFFILIATED WITH BUSINESS PUBLISHERS INTERNATIONAL CORPORATION, PUBLISHERS OF BUSINESS AND TECHNICAL MAGAZINES FOR OVERSEAS CIRCULATION

Keep that Extra Margin of Safety!

The extra margin of safety provided by Atlas Manasite Detonators is an advantage at any time . . . but never more so than in these months of all-out production essential to the war effort.

By reducing the chance of mishap through inadvertent mishandling, Atlas Manasite Detonators help to avoid accidents . . . accidents that may cause serious disruptions in man schedules, equipment schedules, and production schedules.

Of course, no detonator is foolproof. But more than 200 million Atlas Manasite Detonators have already been used

—and their extra margin of safety is a big advantage.

Manasite Detonators require no special equipment or change in methods of use. And they cost no more.

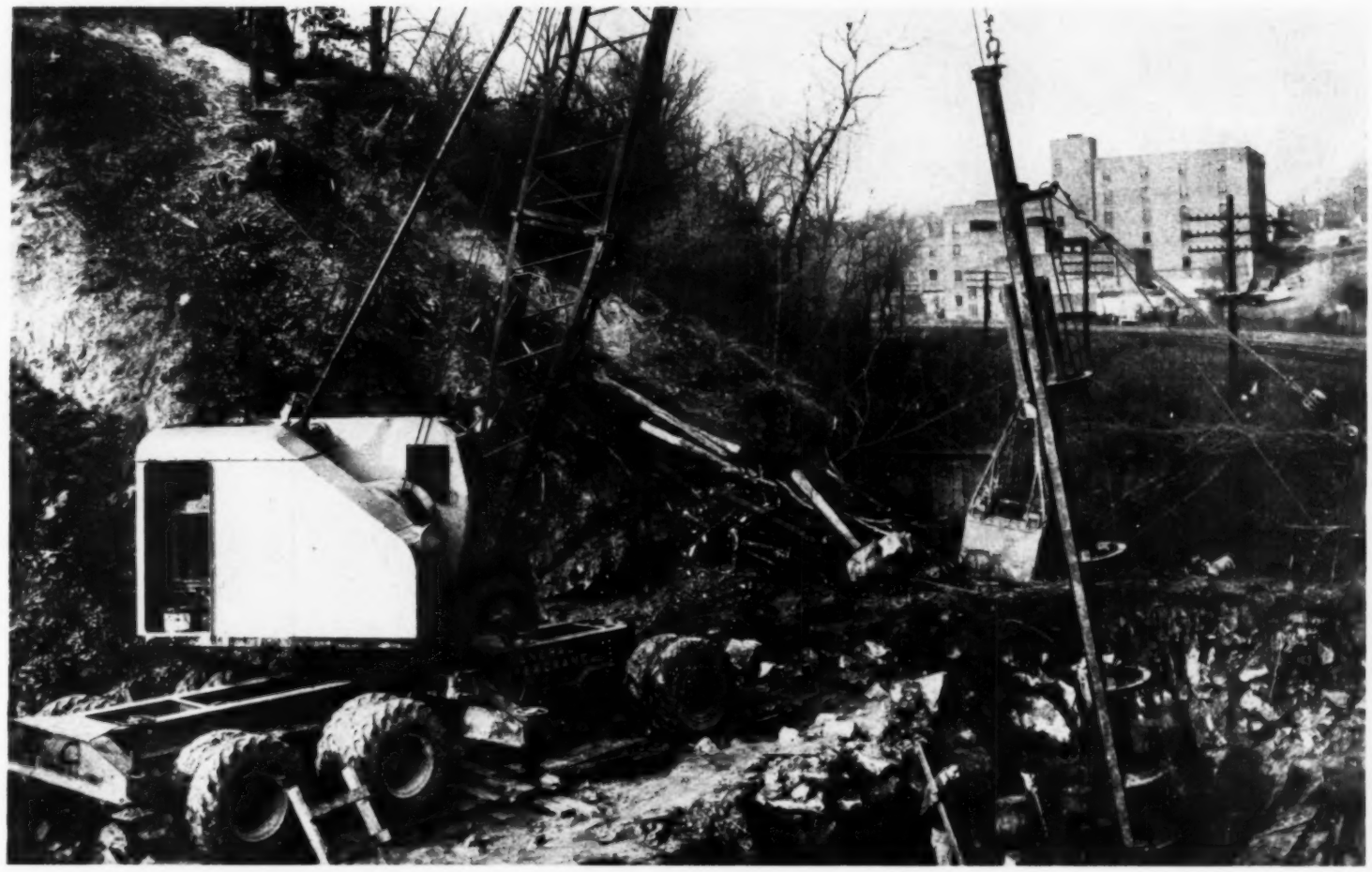
Can you afford *not* to use this advance in safer blasting?

MANASITE—Reg. U. S. Pat. Off.

ATLAS EXPLOSIVES
"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington, Del. · Offices in principal cities · Cable Address—Atpowco



GENERAL

SUPERCRANES are selling faster than we can build them. Still, now is a good time to find out how you can save with a SUPERCRANE. Ask for new Catalog.

GENERAL SUPERCRANES Conserve Vital Fuel, Man-Power and Machinery

Powered by one motor and controlled by one man the SUPERCRANE moves about freely on its pneumatic tires. Movement is much faster, with reduced wear on moving parts. Available as Crane, Clamshell, Dragline, Magnet and Pile Driver.

The OSGOOD COMPANY
Sizes: ½ to 2½ Cu. Yd.
Diesel - Oil - Gas - Electric
Associated with
The GENERAL EXCAVATOR CO.

The HERCULES COMPANY
HERCULES *IRONEROLLERS*
6 to 12 Tons
Diesel or Gasoline
Associated with
The GENERAL EXCAVATOR CO.

GENERAL
Sizes: ⅜-½-⅝-¾ Cu. Yd.
Diesel — Gas — Electric
SHOVELS
DRAGLINES - CRANES
Crawler & Wheel Mounted
THE GENERAL EXCAVATOR COMPANY, Marion, Ohio

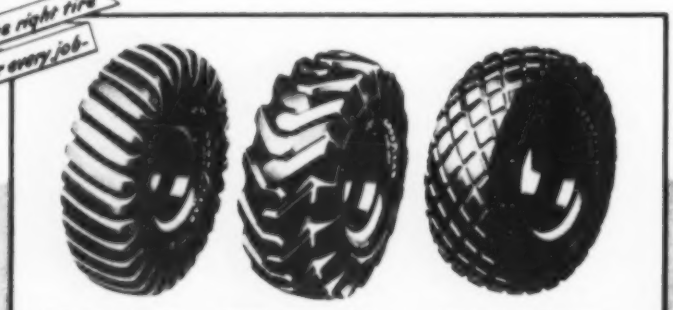
YOU WANT THIS EXTRA TRACTION
for big winter jobs

IN the bad-weather months ahead it's going to be harder than ever to get rush war jobs done on schedule. That makes it more important to get the right tires — *tires that can make the grade.*

For deep snow and mud work the Goodyear Sure-Grip Grader tire has no equal. You can see the reason why in its massive tread. Those powerful stud-bars have deep enough "bite" to grip in any going, and their open-center, wide-channel design insures positive self-cleaning. The result is up to 50% more forward traction, with plenty of reverse grip for backing up.

Add the structural excellence of Goodyear tires, the tougher carcass resulting from multiple compounding and high-tensile cord and you get a tire that's an all-round standout for performance and long wear. That's the reason more tons are hauled on Goodyear truck tires than on any other kind — the best reason for getting Goodyears on your tire certificates.

The right tire for every job



For all rock work	For mud and marsh	For drawn dirt-movers
GOODYEAR HARD ROCK LUG	GOODYEAR SURE-GRIP GRADER	GOODYEAR ALL-WEATHER EARTH MOVER

A GOLD MINE OF INFORMATION

Send for Free Copy

This Goodyear Off-the-Road tire manual is packed with information on proper care and maintenance of tires that insure longer wear — save you money. Every contractor should have this complete service handbook. To get your free copy write Goodyear, Dept. SP, Akron, Ohio.

Goodyear's *new* sound slide film on Truck Tire Conservation is available for showings to group meetings of your drivers and maintenance men. Your Goodyear dealer or service store will be pleased to show it to your employes — just ask about it.

All-Weather — T. M. The Goodyear Tire & Rubber Company

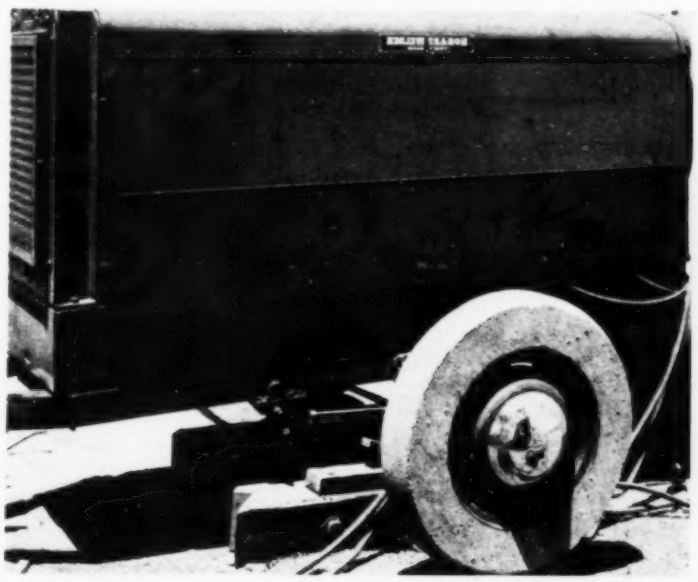
GOODYEAR TIRES

THE GREATEST NAME IN RUBBER

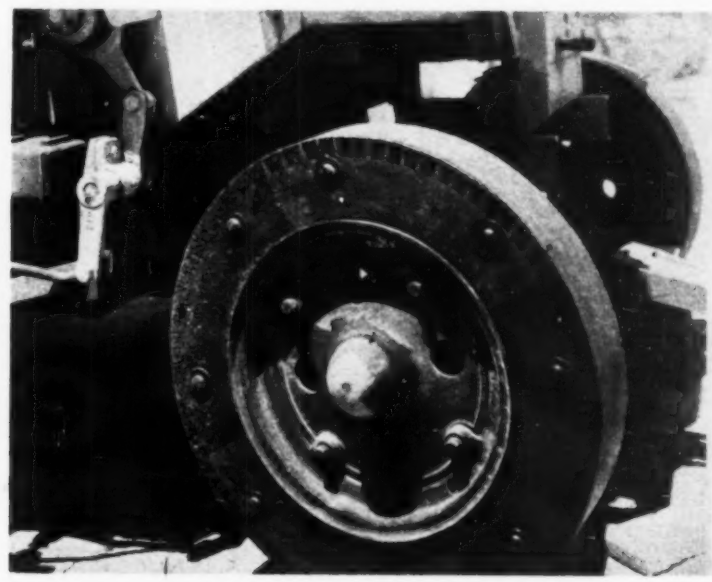
Construction Methods

ROBERT K. TOMLIN, Editor

Volume 24 | DECEMBER, 1942 | Number 12



CONCRETE TIRES are fitted on rims of two-wheel trailer type mounting of portable welding machine.



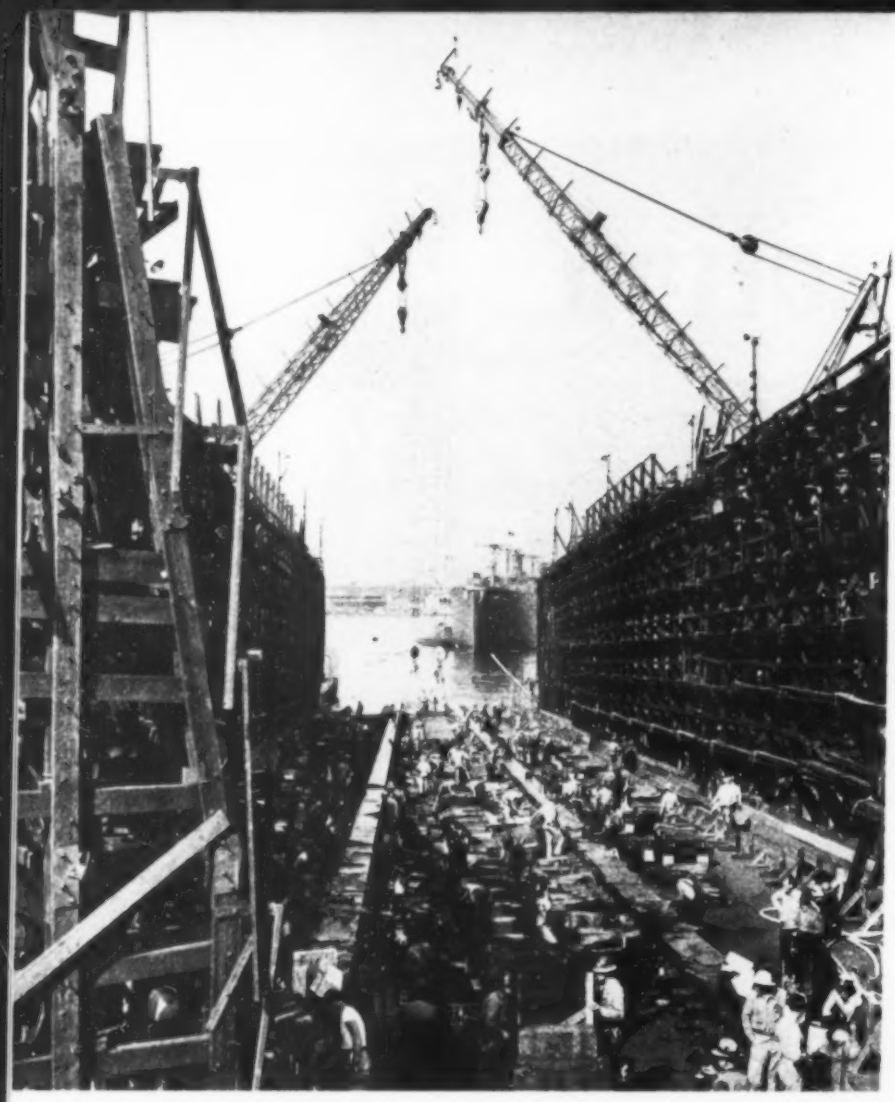
LAMINATED WOOD SEGMENTS, held together by through-bolts, form tires for this portable machine, a concrete mixer at Parker Dam.

Rubber Saved By Mounting Equipment on Tires of Concrete and Wood

INNER AND OUTER FACES (below) of concrete tire for portable welder are here shown. Note U. S. Bureau of Reclamation's war-time inscription "Beat Hitler."

IN AN EFFORT TO CONSERVE RUBBER urgently needed for purposes of war, engineers of the U. S. Bureau of Reclamation at the Parker Dam project in Arizona have mounted portable construction equipment on tires made of reinforced concrete and wood, both non-critical materials. The concrete tires, carrying on their outer walls the inscription "Beat Hitler," as shown in one of the illustrations, were fitted on to the two-wheel trailer mounting of a mobile gasoline powered welding machine, replacing the original 6.5x16-in. pneumatic tires.

On another type of equipment, a portable concrete mixer, tires of wood were substituted for the standard rubber-tire mounting. As pictured, these tires are made of laminated wood segments, with the edges of the treads protected by bent metal plates nailed to the tire walls. The tire width is made up of three segmental leaves, placed to break joints, and held by through-bolts.



HUNDREDTH KEEL for 10,500-ton Liberty cargo ship for U. S. Maritime Commission is laid at West Coast yards of California Shipbuilding Corp. Vessel of welded steel plate construction will be named *Benjamin Ide Wheeler*, after first president of University of California. Press Association Photo

OIL PIPELINE covering 550-mi. distance between Longview, Tex., and Norris City, Ill., is scene of rush construction as Caterpillar tractor, equipped with side boom, picks up welded section of 24-in. steel tube for lowering into trench. New plans contemplate extension of line from Illinois to Eastern seaboard. Seven contractors are building Texas-Illinois pipe line.
Wide World Photo

THIS MONTH'S NEWS REEL

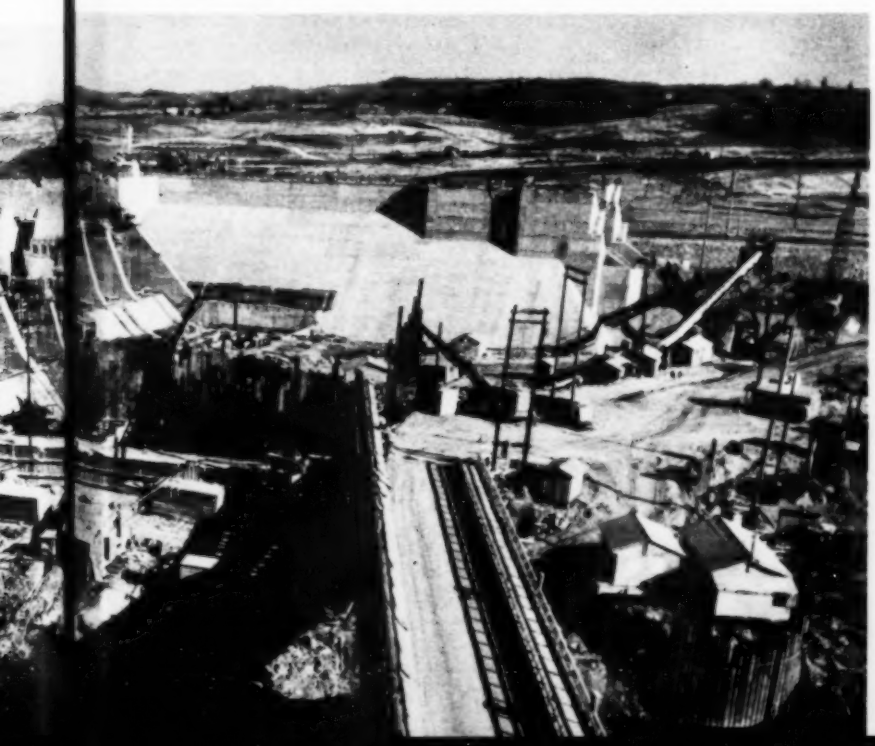
AT NEW STEEL MILL (below) he is erecting near Fontana, Calif., HENRY J. KAISER **(left)** builder of dams, ships, cargo airplanes and cement plants, confers with TOM PRICE, construction manager, on progress of work. In background is blast furnace which will produce 1,200 tons of pig iron daily when it goes into production early next year. Wide World Photo

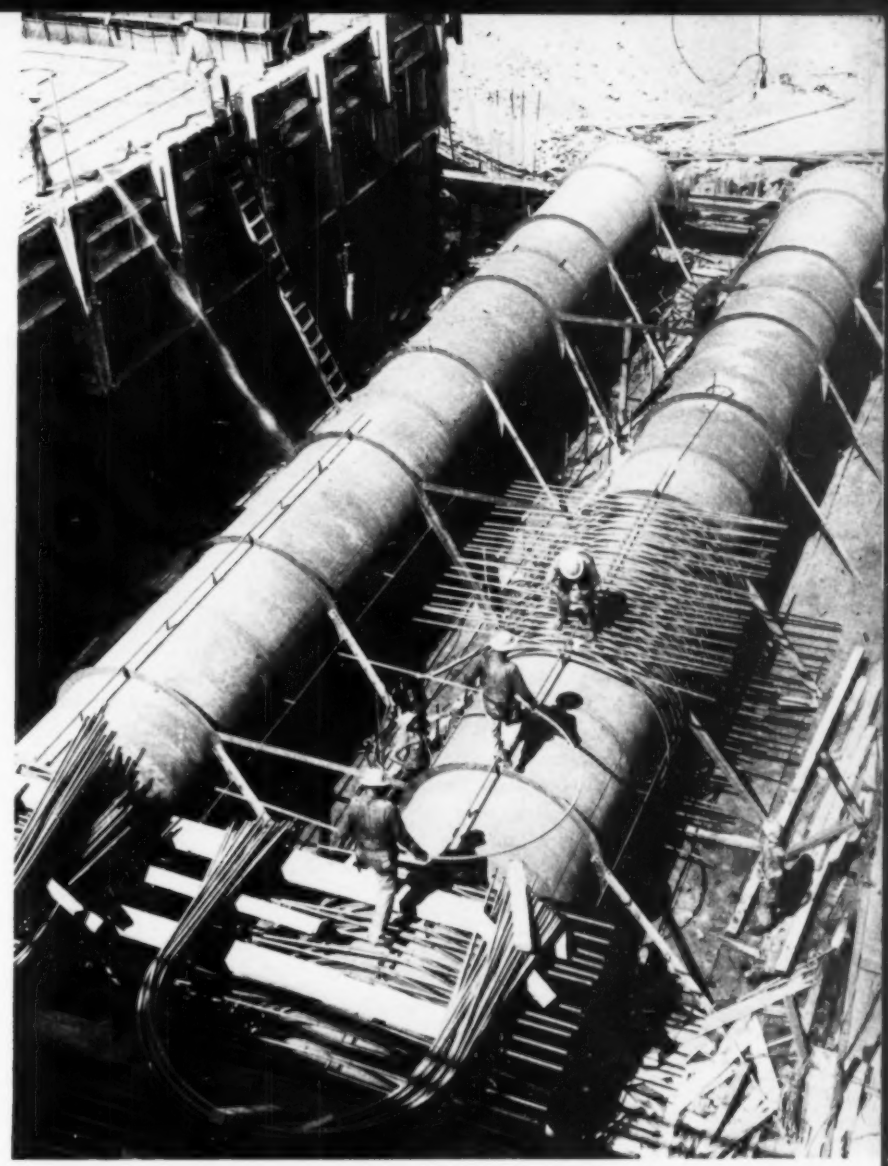
ON RAILWAY CONSTRUCTION IN SYRIA, following route along eastern Mediterranean coast line between Tripoli and Haifa, American equipment, represented by Caterpillar tractor with LeTourneau bulldozer, spreads earth and rock fill to bring grade of right-of-way up to level of tunnel through cliffs.

British Official Photo

AWARDS FOR PAPERS ON WELDING PROGRESS are here being determined by jury of engineers selected by James F. Lincoln Arc Welding Foundation, of Cleveland, Ohio, which sponsored contest. Prizes totaling $200,000 were distributed among 458 participants. First grand award of $13,700 went to CAPT. C. A. TREXEL and A. AMIRIKIAN, Bureau of Yards and Docks, Navy Department, for paper on welded steel caissons for naval drydocks.

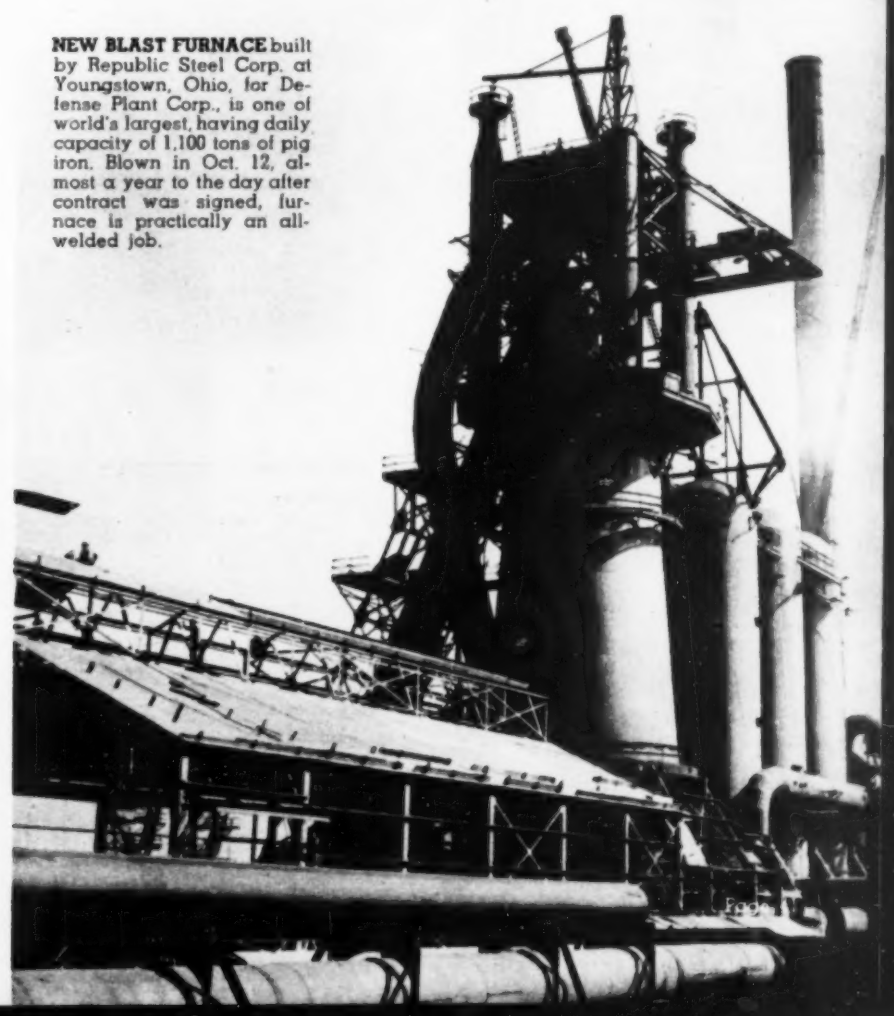
FORT LOUDOUN DAM (below). Tennessee Valley Authority project, takes form within cofferdam on Tennessee River. Portion of spillway is shown in background, with outlines of navigation lock beyond. Dam will be 3,870 ft. long and will rise 122 ft. above bed of river. Reservoir formed by structure will cover 14,900 acres and will extend 55 mi. upstream.





TO FEED MADERA CANAL, with 1,000 sec.-ft. of water which will irrigate crop lands under Central Valley project in California, steel outlet pipes 7 ft. 7 in. in diameter and 100 ft. long are installed in Friant Dam, U. S. Bureau of Reclamation structure of concrete being completed by Griffith Co. and Bent Co., contractors. Canal extends northerly from Friant 37 mi. to branch of Chowchilla River.

NEW BLAST FURNACE built by Republic Steel Corp. at Youngstown, Ohio, for Defense Plant Corp., is one of world's largest, having daily capacity of 1,100 tons of pig iron. Blown in Oct. 12, almost a year to the day after contract was signed, furnace is practically an all-welded job.



Tough Airport Grading Job

DEMANDS SHOP FACILITIES AND TOOLS FOR

Equipment Maintenance

OBSTINATE AND ABRASIVE in its resistance to excavators, indurated boulder clay, impregnated throughout with hard, rounded stones of varying size and numbers, took heavy toll of a vast mass of equipment operated day and night under separate contracts by three firms to complete 9,000,000 cu.yd. of grading in 130 calendar days for the Corps of Engineers, U. S. Army, on an eastern airport. Exceptional toughness and abrasiveness of the compacted, boulder-laden clay, estimated to comprise as much as 85 percent of the material on one contract, put a heavy strain on digging equipment and quickly wore out dipper teeth, ripper teeth and cutting edges of scrapers. Only by operating well-equipped and well-staffed maintenance shops on the job were the contractors able to hold shutdowns for repairs to from 20 to 22 percent of the total machine time.

Despite the difficulties of the obstinate material and of excessive rainfall during the contract period, the contractors drove equipment with such effect that the 700-acre field was ready for dedication by the Army on the scheduled completion date. All contracts were competitive-bid jobs, and officers of the Corps of Engineers directed all operations.

All three contractors encountered large volumes of boulder clay. The following notes describe the work on contracts 1 and 2. A description of contract 3 is omitted only because the visiting editor was denied the time to cover the third contract. Information given in these notes was obtained from the men in charge for the contractors on the two jobs.

Boulder Clay — The preponderant material encountered in the 9,000,000 cu.yd. of grading was an indurated blue clay deposited as a glacial drift and compacted to densities as great as 148 lb. per cu.ft., exceeding the weight of many classes of concrete. No part of the indurated clay was free from hard, rounded boulders tightly bonded in the mass. The number and size of boulders varied greatly in different

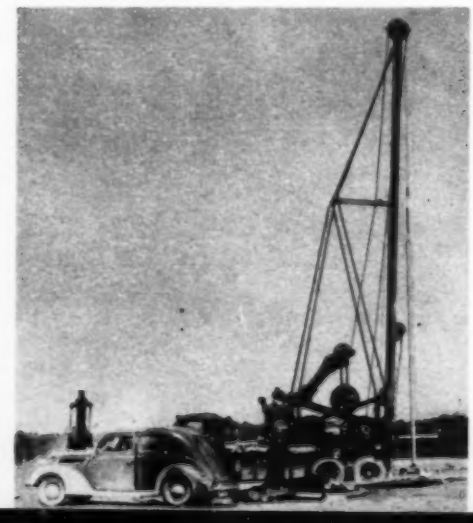
PUSHED BY BULLDOZER (below). tractor-scraper picks up load of ordinary overburden material previously loosened by ripper.

TRACTOR-WAGON (below) with four-wheel-drive power unit takes on 17-yd. heaped load of boulder clay swung aboard by diesel excavator.

Grading

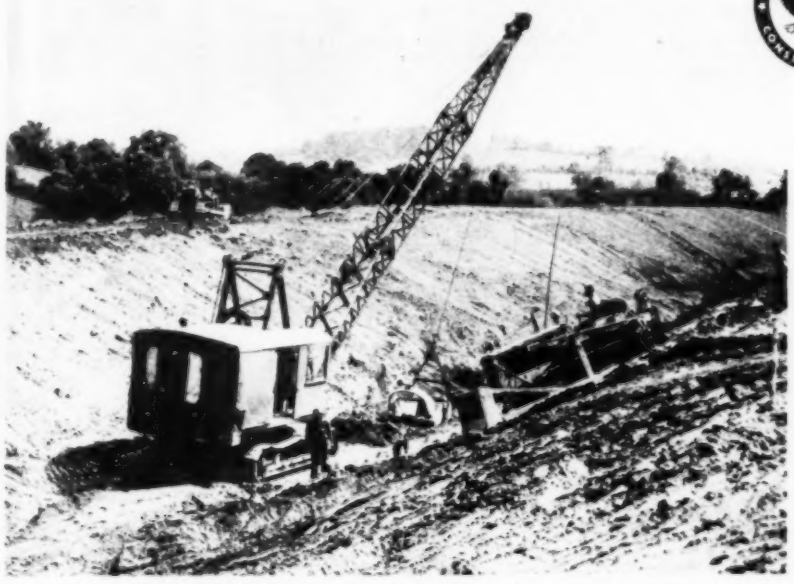
EVEN AFTER BEING SHATTERED (below) to grade by blasting in well drill holes, boulder clay stands in vertical bank, requiring equipment to climb slopes to where material can be taken off in lifts. Arrows point to four shovels in background.

WELL DRILL RIGS (below) mounted on trucks sink 6-in. blast holes in boulder clay to grade at maximum depth of 80 ft. below top of bank.



DUMPED ON FILL. boulder clay is spread by tractor-bulldozer. Note character of this material after blasting, excavating and dumping.

BIG BUGGIES drawn by crawler tractors haul material loaded by 2½-yd. diesel shovel.



DRAINAGE DITCH to intercept groundwater around three sides of airfield is excavated in earth section by dragline. Tractor-bulldozers finish slope.

3½-YD. SHOVEL fills tractor wagon of 13-yd. capacity, struck measure, with boulder clay. Two 3½-yd. shovels, including this unit, and two 2½-yd. shovels get their first taste of digging on this job.

places, but they always were present. In size, exceptional stones ranged up to 3 cu.yd., and one was reported of 39 cu.yd. Except for the additional block-holing and blasting required for the larger boulders, the size of the stones was not an important factor in retarding excavation; a ½-yd. chunk, bonded in the clay, could stop a shovel dipper as effectively as a heavier rock.

Drilling and blasting constituted the only feasible method of loosening the indurated boulder clay for excavation. The two contractors employed different procedures, one sinking large-bore holes to great depth with well drills and the other shaking up 10-ft. lifts with small-diameter blast holes put down by wagon drills. According to the contractor's engineer on the latter job, production by this firm's 3½- and 2½-yd. shovels would have been 40 percent less if the material had not been blasted. Even after blasting, big shovels were needed wherever boulders were numerous, as 1¾-yd. machines could not handle the material.

Excavating equipment suffered in two ways: The obstinate, abrasive material dulled and wore out the tools, and the heavy digging imposed excessive stresses which resulted in breakdowns. Even heavy-duty rippers breaking up blasted material for scraper loading would kick out of the shattered boulder clay. These rippers operated with two 100-hp. diesel tractors, one pulling and one pushing. Hard-surfaced ripper teeth lasted 4 hr.; by this time the shank as well as the tooth would be worn away. Tractor-scrapers which came in after the rippers had loosened the blasted boulder clay were able to get about 70 percent of normal production.

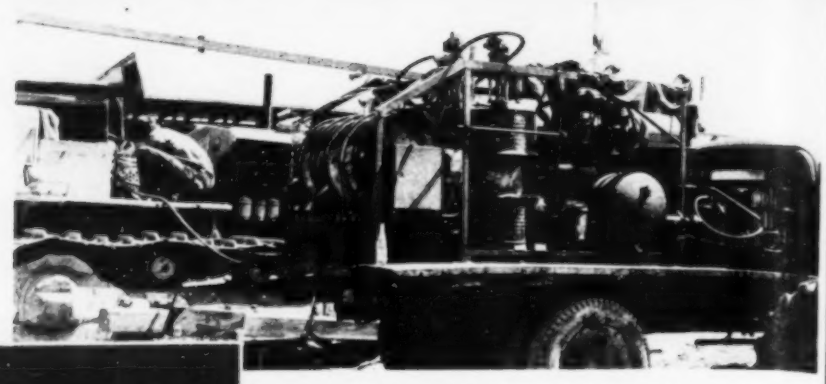
Special hard-surfaced dipper teeth were good for from 24 to 48 hr. of digging; the average was 36 hr. After this much use, dipper teeth ordinarily had to be rebuilt with new cut-

TALL FLOODLIGHT TOWER (below, left) carrying fourteen 1,500-w lamps high above first aid station, is hooked up to commercial power supply. Trained attendant is always present in first aid station.

TEN WAGON DRILLS (below) taking air from three 700-cfm. compressors sink 12-ft. blast holes for shattering 10-ft. lift of boulder clay.

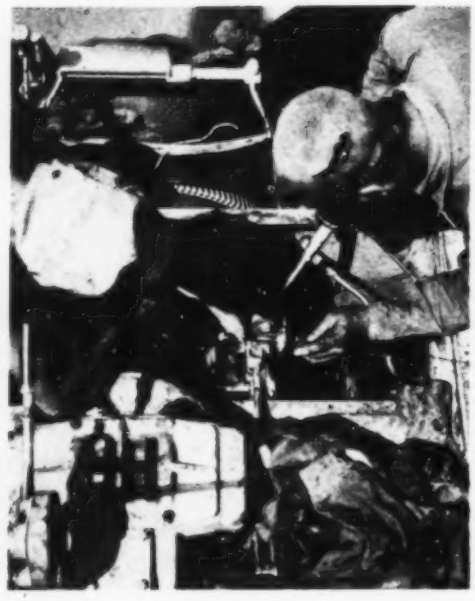
WELDING GENERATOR ON TRUCK supplies current for repairing leaking diesel fuel tank with Lincoln soft steel electrode. Pyrene fire extinguisher is held in readiness by welder's assistant to put out any blaze.

Maintenance

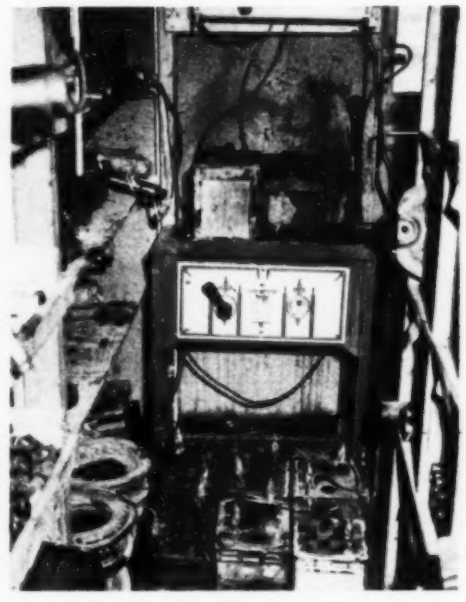


PRESSURE LUBRICATION is carried to machines operating in field by Graco unit mounted on truck. Compressor included in lubrication unit supplies air for inflating tires.

BROKEN CASTING on bearing race of tractor shaft is temporarily replaced with steel ring shrunk on to fit.



BROKEN THROTTLE ROD on tractor is braze welded in field with Purox torch drawing gas from cylinders on maintenance truck.

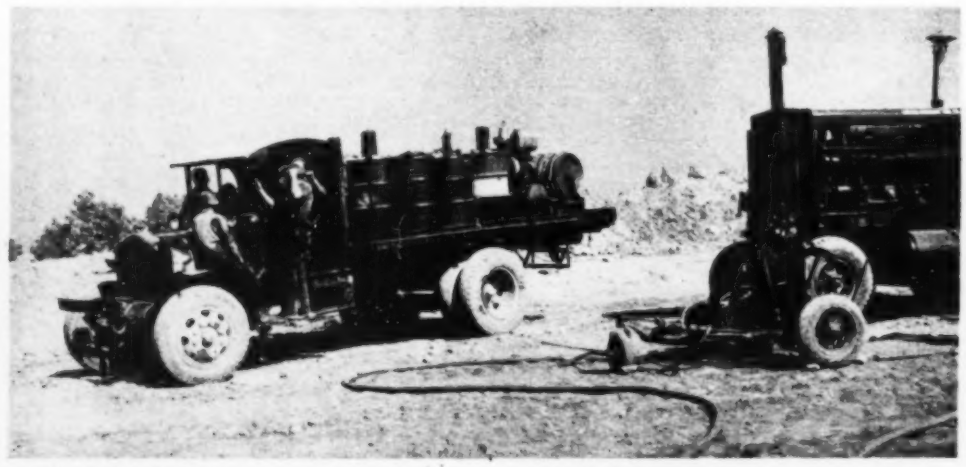


SIX BATTERIES PER UNIT can be recharged by two G-E battery rechargers in electrical shop. Only lower part of upper unit can be seen.

ting edges which were then hard-surfaced with alloy steel electrodes. The boulder clay was equally abrasive in its effect on the detachable bits used with one contractor's wagon drills. Production by the drills was less in boulder clay than it would have been in solid rock. Much time was lost by sticking of drill steel when bits were deflected by sloping surfaces of buried boulders.

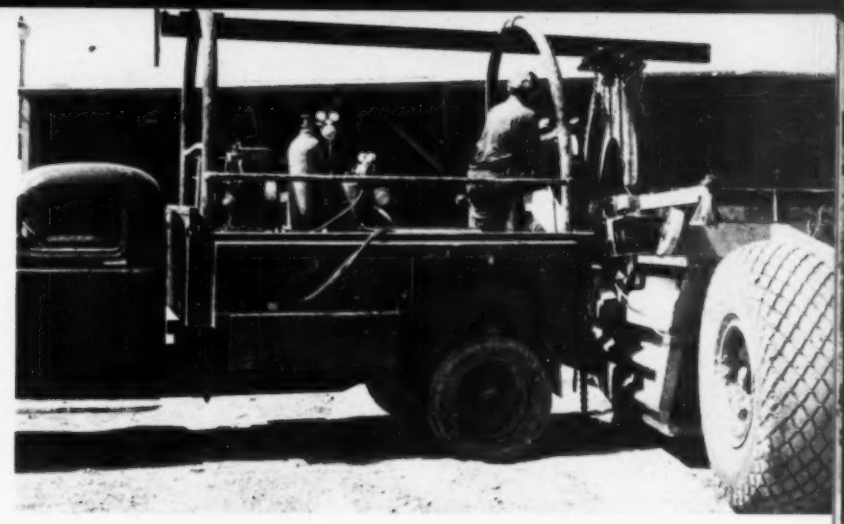
Total capacity of the plant of one contractor on the job was conservatively estimated at 67,000 yd. per day, without any allowances for servicing, repairs and bad weather. During the first two weeks after the full plant had been assembled on the job, while taking off about 15 ft. of overburden prior to striking boulder clay over a large part of the area, production averaged 42,000 yd. per day. At the end of this period, when the equipment encountered the boulder clay, output dropped to an average of 32,000 yd. per day. This daily yardage corresponded closely with the potential output estimated on the basis of the following time deductions: Servicing (greasing, etc.), 10 percent; repairs, 20 percent; bad weather, 25 percent.

BLACKSMITH SHOP (left) is equipped with Canedy-Otto forge and tools to assist blacksmith in producing new parts and making repairs to equipment.



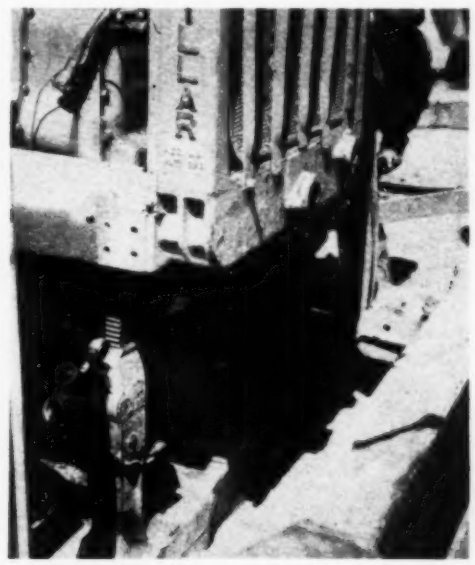
TRAVELING SERVICE STATION of large size is mounted on old truck to carry pressure-greasing and tire-inflation facilities to equipment working in field.

TRACTOR ENGINE is taken down in garage for new piston rings and valve grinding.



FRAME OF BIG SCRAPER is raised by Chisholm-Moore chain hoist on truck-mounted trolley beam to permit welding repairs. Note compressors and gas welding and cutting equipment on truck.

TRACTOR REPAIRS are speeded by use of Sioux ½-in. drill to cut new bolt holes.



FRONT END of tractor chassis is picked up on two Simplex 10-ton jacks.

AFTER GETTING MAXIMUM WEAR out of these tires, maintenance man in charge of tires brings in grader shoe (left) and front tire of tractor-wagon unit for retreads.

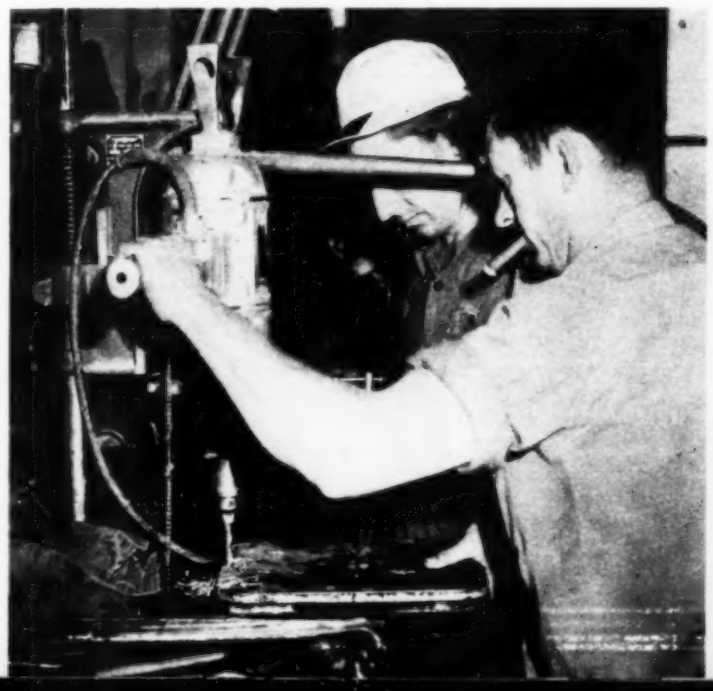
On the other contract, about 22 percent of shovel time was lost for maintenance repairs. For various units of the 13 shovels operated by this contractor, shutdowns for repairs took 18 to 25 percent of the machine time. Other equipment on the job lost about the same proportion of time in maintenance repairs.

Maximum one-way haul on the one contract was about 1 mi., required to circle existing facilities on the airport; the average haul for rubber-tired equipment on this job was about 2,000 ft., one way. Tractor-scrapers averaged 1,000 ft. of one-way haul for much of the job, but they hauled up to 2,400 ft. on the final 40 percent of the work, making the overall job average for tractor-scrapers about 1,600 ft. The heaviest cut was 96 ft., and the deepest fill was 48 ft.

A fairly complete list can be given of equipment on this contract. Because a large amount of equipment was leased from other contractors for this job, a variety of makes is represented. Not all of the equipment was in use throughout the job. As parts of the work were completed or calls for

(Continued on page 96)

DRILL PRESS (below) made up of Black & Decker 1-in. drill and drill stand puts holes in new inspection plate for bottom of tractor crankcase.



WELL-STOCKED SHELVES (below) of contractors' storeroom supply needed parts and materials for keeping equipment in service.

LAYOUT OF SHIPYARD shows, left to right, railway siding for delivery of lumber, stock piles, framing platforms, operating aisle for crawler cranes, four inclined shipways, each designed te accommodate two pontons, and a group of completed pontons anchored in river.

Army "Shipyard"

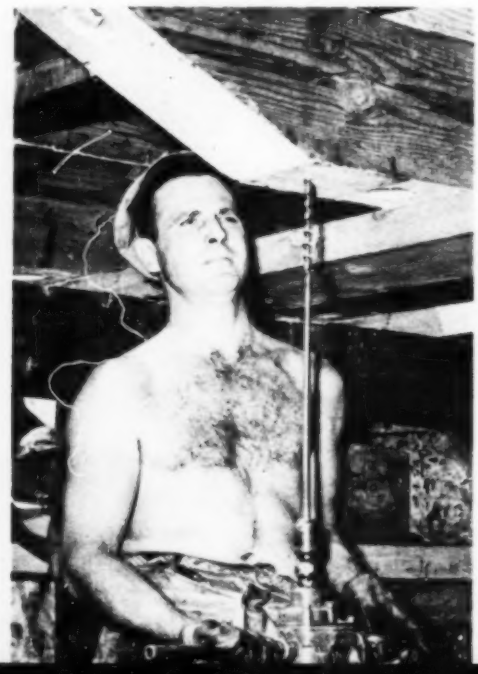
Builds Wood Pontons for Floating Bridges

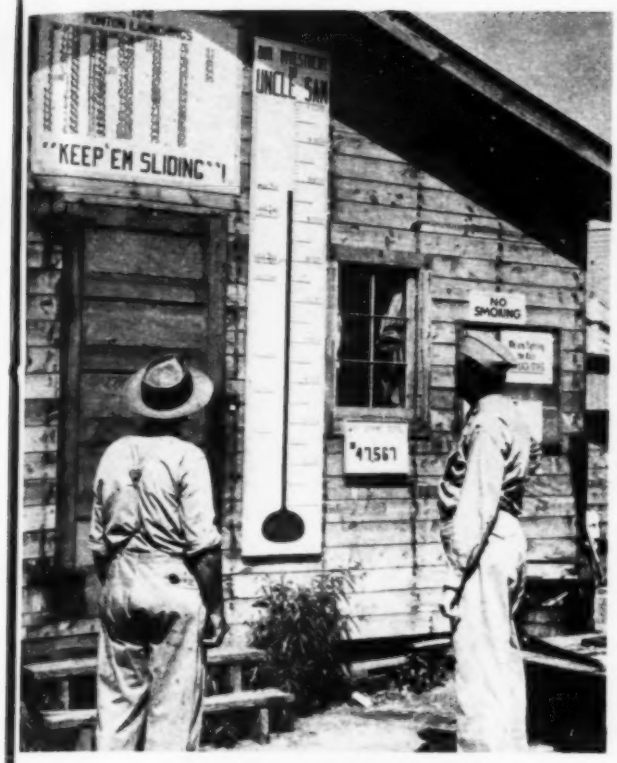
To Serve Washington's War Time Traffic

Photos, U. S. Army Signal Corps.

ASSEMBLED ON SHIPWAY (below) are keelsons, deck stringers and cross-frames, ready for insertion of long through-bolts for tying structure together. For keelsons and other members 10x10-in. Douglas fir timber is used.

BORING OF KEELSONS (below) to receive through-bolts and drift pins is done with Ingersoll-Rand air-operated wood auger.





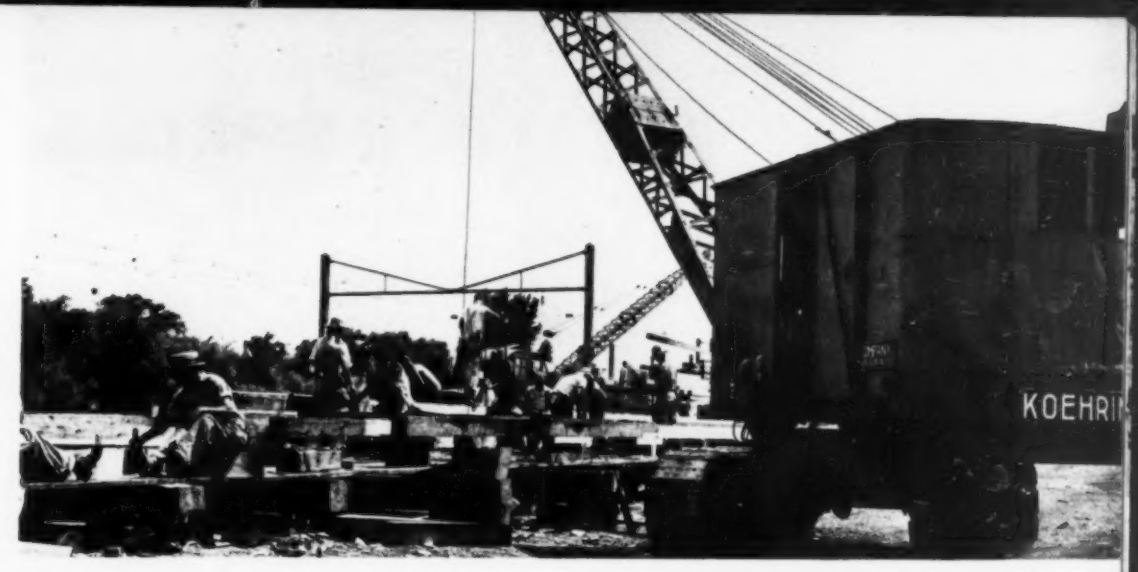
RECORD OF LAUNCHINGS. with exhortation to "Keep 'Em Sliding," is maintained on large bulletin board above door to field office at shipyard. Purchase of War Stamps by construction crew is indicated graphically by large thermometer, viewed by W. S. OBERLEY (left) superintendent of the yard, and LIEUT. N. R. ARCHER, area engineer.

AT AN ARMY "SHIPYARD" on the Anacostia River, eastern branch of the Potomac in Washington, D. C., the Corps of Engineers has directed the building and launching of 96 wood pontons, each 65 ft. long and 12 ft. wide, to serve as floating supports for four emergency bridges carrying traffic across the Potomac and the Anacostia Rivers between the National Capital and the shores of Virginia and Eastern Maryland. Laid out to utilize mass production methods, involving prefabrication of keelsons, cross-frames and other parts of the pontons, the yard, located at the foot of Pennsylvania Ave. and 17th St., S.E., is equipped with four inclined ways for side-launching of the completed floating units, which were built under contract by the Frederick Snare Corp., of New York.

Assembly of Pontons

Each ponton required 13,500 b.ft. of lumber, which was delivered to stock piles along a railroad siding serving the yard and transferred as needed to layout platforms, just beyond the inshore ends of the launching ways. Here keelsons and deck stringers of 10x10-in. Douglas fir were framed into bolted assemblies for transfer by a crawler crane to the ways, where the necessary cross-bracing and through-bolts were installed. Each of the four ways accommodated two pontons, making it possible to assemble eight pontons simultaneously. Boring of the heavy timbers to

(Continued on page 112)



ON LAYOUT PLATFORM keelsons of 10x10-in Douglas fir and deck stringers are prefabricated, as Koehring crawler crane keeps workers supplied with materials and transfers finished assemblies to launching ways.

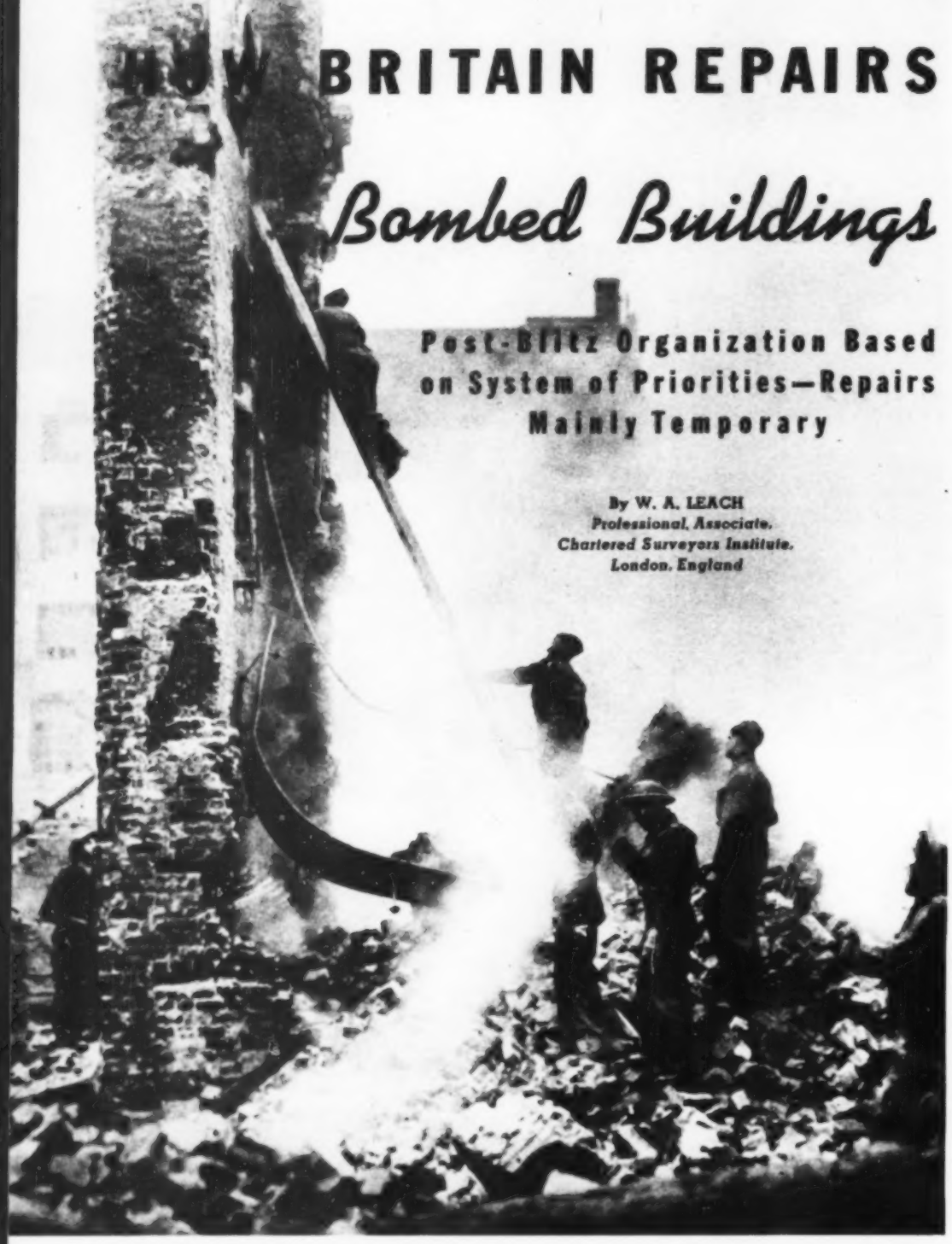
WITH HEAVY-DUTY RATCHET WRENCH worker on shipway tightens nut on through-bolt extending through deck stringer and keelson.

PRELIMINARY TO LAUNCHING (below) one of the 65x12-ft. pontons, workers use battering ram to knock out wedges and transfer weight to skids.

HOW BRITAIN REPAIRS *Bombed Buildings*

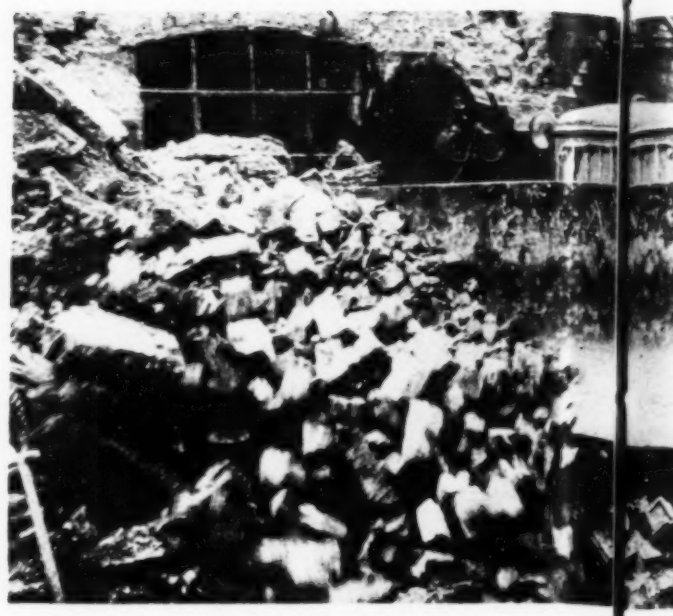
Post-Blitz Organization Based on System of Priorities—Repairs Mainly Temporary

By W. A. LEACH
Professional Associate,
Chartered Surveyors Institute,
London, England



DEMOLITION OF MASONRY WALLS is undertaken by repair crew, who attach rope for pulling down bomb-wrecked structure.

DAMAGE TO BOMBED BUILDINGS (below) resulting from air raid on London is surveyed prior to removal of debris and repair of such structures that can be made habitable. Acme Photo



REPAIRING WAR DAMAGE to buildings is usually a matter of clearing away loads of shattered brickwork, fallen plaster and broken glass, followed by a temporary patching up with such materials as can be procured. It is a monotonous, repetitive job in house after house which would make a good craftsman shudder. But it is in this uninviting description of the task that the key to the whole problem lies—organization.

The first step in organization is preparation to deal with those loads of rubbish which begin to appear in the street outside every damaged property soon after the "blitz" is over. Despite regular clearance, the heaps seem to go on being built up for weeks after. Next comes a system of classification of properties and damage, so that priority can be given in order of urgency in the national interest. And finally comes the preparation of the building industry to cope with the damage.

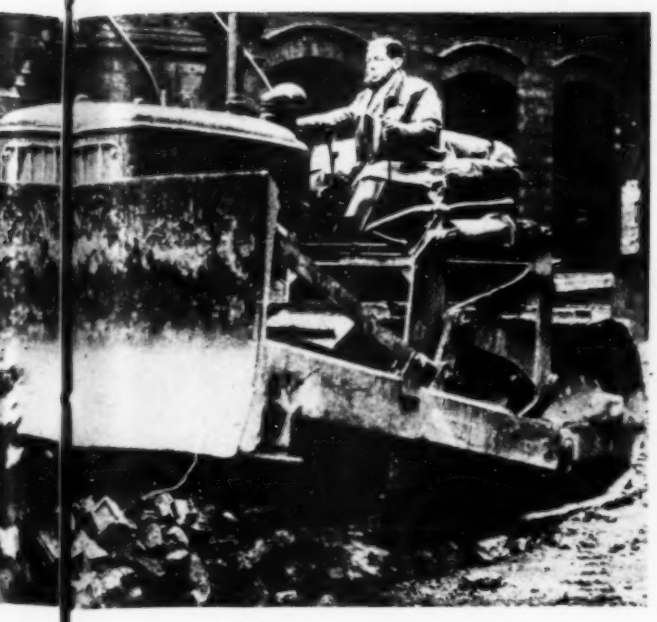
Disposal of debris is mainly a matter of arranging for proper transport to be available, selecting the position of dumps, and planning the salvage of metals and usable timber.

Repair Priorities

The order of priority for repairs needs careful consideration. Factories on war work come first, and must not be deprived of labor and materials, even if complete rebuilding is entailed, unless other suitable accommodation for continuous use can quickly be found.

The homes of the people must also rank high in the list of priorities, from considerations both of health and morale, but in this category there will rarely be any complete rebuilding. Until the recent "Baedeker" raids, most raids were on areas where bombing had been anticipated, and public and private evacuation of persons, government departments and private firms had com-

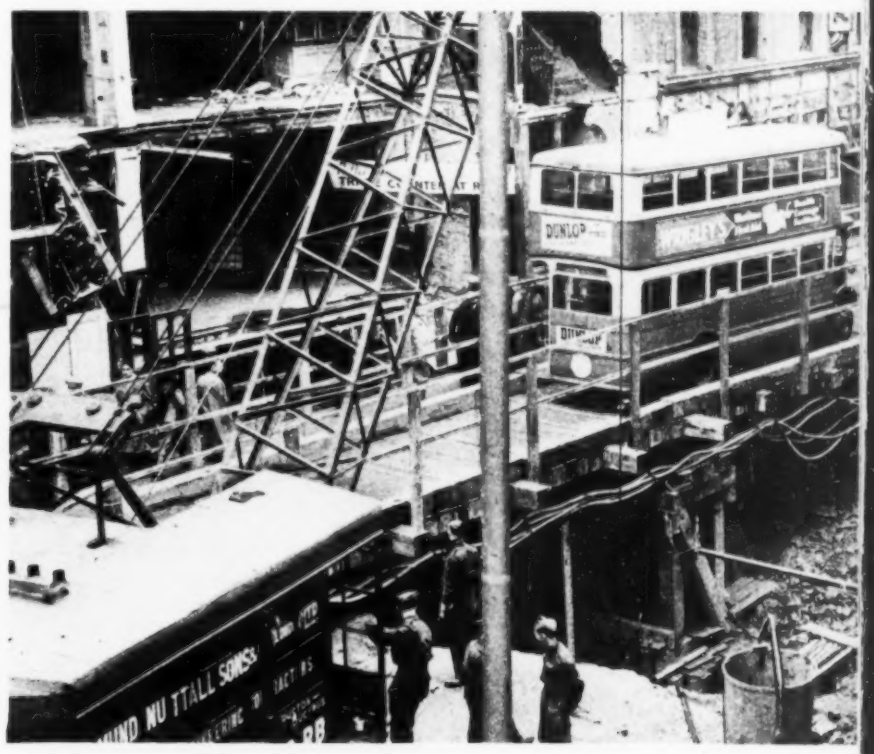
(Continued on page 108)



MECHANICAL EQUIPMENT helps clean up wreckage caused by bombing. At left, Caterpillar tractor equipped with LaPlant-Choate bulldozer blade piles up shattered brick masonry prior to removal. At right, truck-cranes are rushed to site of disaster to handle heavier pieces of debris

British Combine Photo

REPAIRS OF SHATTERED ROOFS of bombed British houses are made by employees of local councils. British Combine Photo

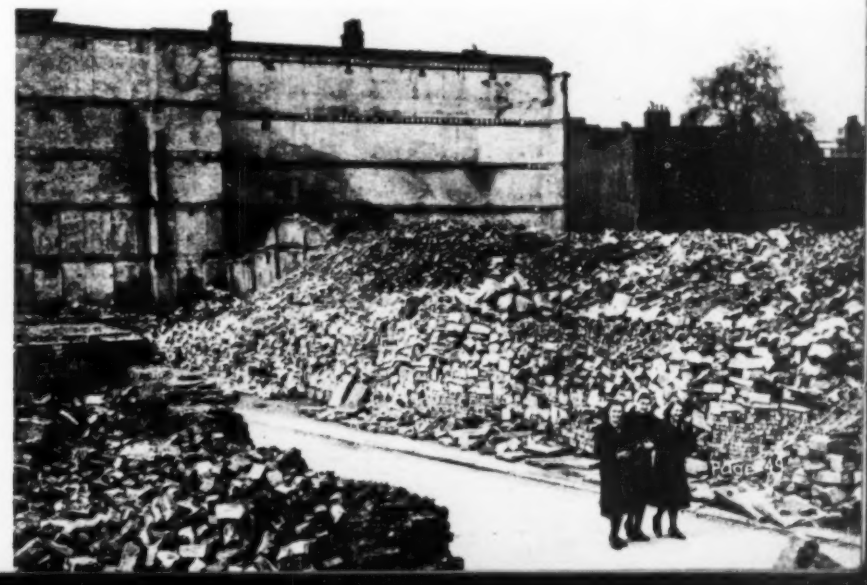


LARGE BOMB CRATER is bridged with emergency timber structure to carry traffic pending filling of hole and repaving of street. British Combine Photo

RECONSTRUCTION (below) is undertaken on brick houses in ill-fated Coventry, where enemy bombers took exceptionally heavy toll.

British Combine Photo

PILES OF RUBBISH (below) begin to appear in street along every damaged property soon after "blitz" is over. First step in organization for repair work is preparation for removal of this debris. British Combine Photo

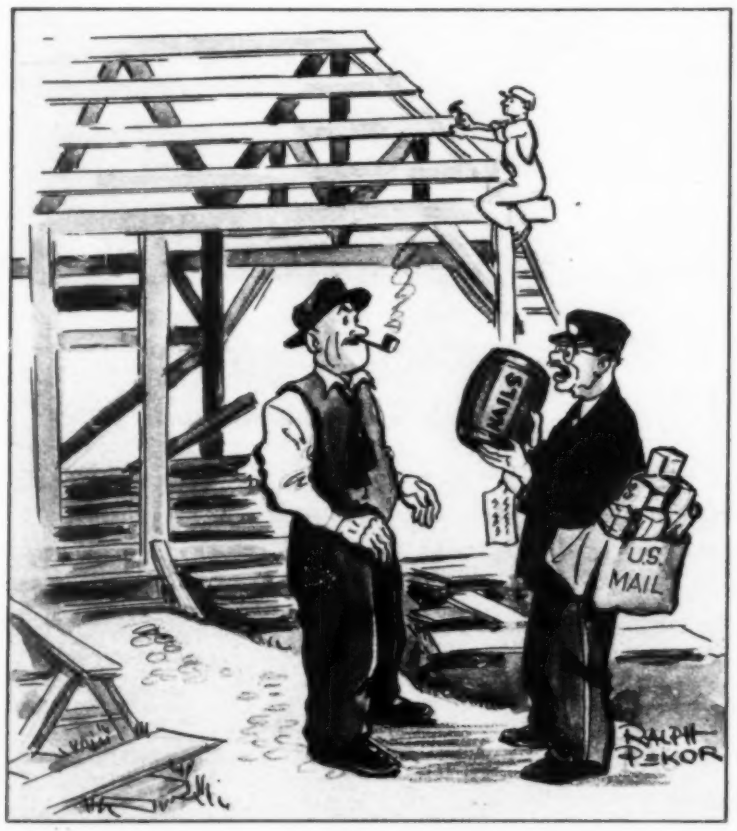


THE JOB JESTER

CARTOONS DRAWN FOR CONSTRUCTION METHODS

"We'll have to get a new guard—all he does is laugh hysterically at each identification photo!"

HANGING IN THE VICTORY BALANCE !



"I have an insured parcel for foreman Brown."

Pre-framed Timber Bridge

Erected by Single Truck-Crane as Cable Ties Hold Half Trusses

By HOLMAN HARVEY
Timber Engineering Co., Washington, D. C.

ERECTION OF TRUSSES, in halves, was done by Lorain truck-crane operating from plank decking on false bent abutment to extend reach of boom. Each half-truss weighs 7 tons.

TIMBER HALF-TRUSS for three-hinged arch of 88-ft. span is prefabricated with aid of split-ring connectors. Depth of truss is 21 ft. at seat and 3½ ft. at crown.

SKILLFUL ERECTION with a single truck-crane marked construction of a new pre-framed, all-timber bridge in Portland, Ore. City traffic crosses the structure today, while Multnomah County engineers who designed it scan the results of performance tests carried out under the operating conditions of an H-15 loading. The bridge has fulfilled the exacting requirements laid down for it. Bridge Engineer A. R. Fairbank sums up his observations in a vest-pocket paragraph:

"The structure seems very substantial, there being no appreciable deflection under traffic. Although the weight of the asphaltic concrete pavement alone is 600 lb. per lin.ft. of roadway, there is very little vibration under traffic."

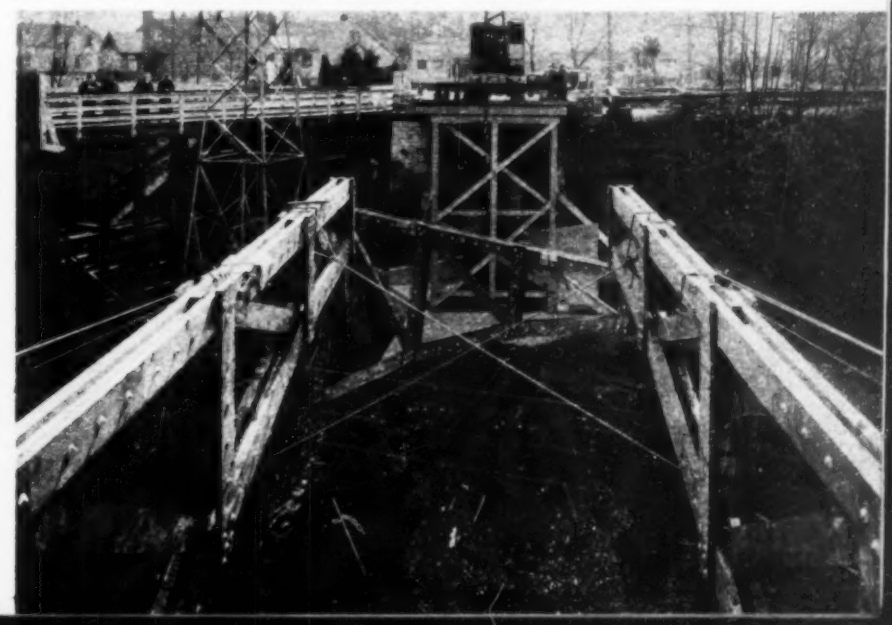
The Multnomah bridge is an example of heavy-timber engineering, involving prefabrication of members and the use of split-ring connection. Framing and erection were by Timber Structures, Inc., Portland.

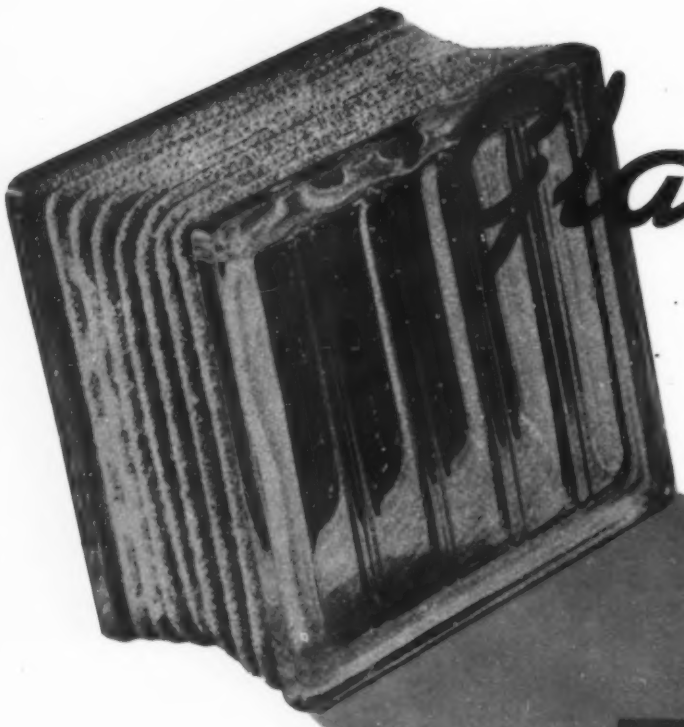
Location and Design — The 132-ft. bridge was built to replace an old frame trestle which carried the traffic of S.E. Tacoma St. over an interurban electric railway running to

(Continued on page 120)

COMPLETED TIMBER ARCH SPAN (below) of 88 ft. crosses interurban electric railway which may be converted into highway at future date. Parabolic lower chords have rise of 18 ft. and are spaced 18 ft. apart.

WIRE ROPE CABLES (below) extending from points near crown to deadmen behind abutment hold half-trusses in position while other halves are being erected. Trusses are also guyed to prevent lateral movement. Arch ribs are made up of two members each, with filler between them.





Glass Blocks

AID CONVERSION OF FACTORY SPACE INTO COMPANY OFFICES

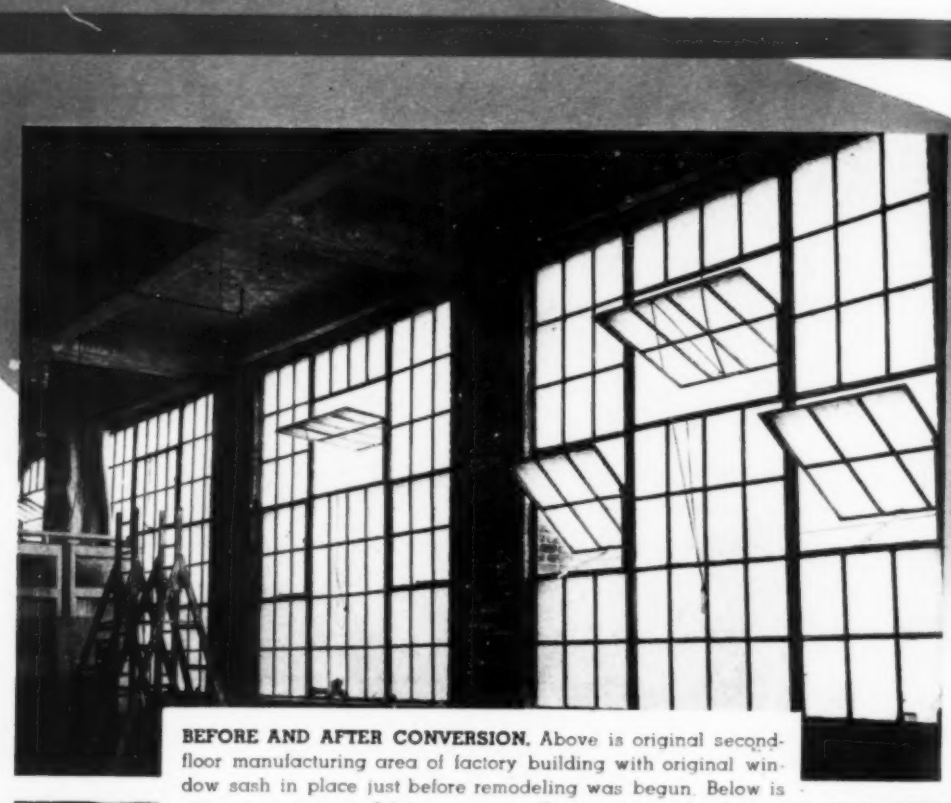
WITHOUT NEW BUILDING or making any use of war-critical materials, a busy defense factory on the New Jersey bank of the Hudson River has recently modernized its offices and expanded its manufacturing area. The Aeroil Burner Co., housed in a three-story, block-long plant devoted to the manufacture of industrial oil burners, water heaters, asphalt heaters and road-building equipment, was recently forced by increasing war business to make fuller use of its existing factory facilities or look elsewhere for additional space.

George P. Kittel, president of the corporation, decided to follow the more expedient course and make a more efficient use of existing space. As originally planned, the office and administration areas were located on the ground floor of the plant immediately adjoining the heavy manufacturing areas. Because of circulation requirements, the offices were badly separated and accessible in several cases only by crossing parts of the manufacturing area. The disadvantages of this arrangement were obvious, but it remained for the pressure of war production to force a change. The existing conditions not only handicapped administration and production, but fine metallic dust, created by welding and metal working, settled over desks, files and clothing, obscured windows and otherwise interfered with office routine.

Factory Space Converted

To correct this condition and to provide additional manufacturing space, it was decided to group all offices at one end of the second floor, in an air-tight, dust-tight room. The second floor manufacturing layout was easily adjusted and restricted to allow for the diversion of about 3,700 sq. ft. to office use.

The conversion of this former factory space, done under the supervision of Lester J. Gulit, production engineer, required about five work-weeks. First step was to seal the new office space



BEFORE AND AFTER CONVERSION. Above is original second-floor manufacturing area of factory building with original window sash in place just before remodeling was begun. Below is same area converted into company offices with panels of light-diffusing, non-glare Insulux glass blocks replacing old sash.

against dust and sound. This was accomplished by replacing the old, worn-out factory sash with panels of light-diffusing Insulux glass blocks, each having dimensions of 8x8x4 in.

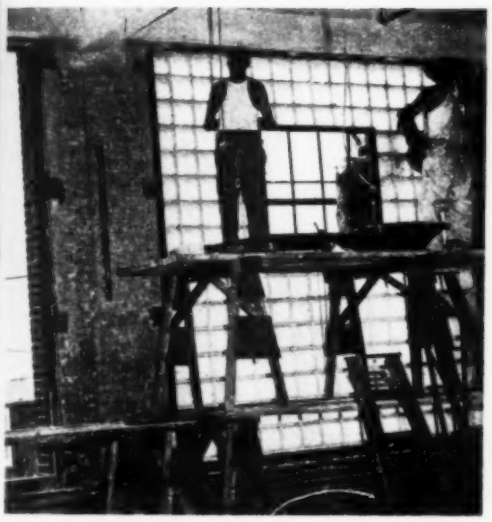
The installation of the glass blocks was ingeniously managed. The old sash had been held rigidly in place with light metal angles. These were salvaged and welded edge to edge to form channels. Bolted to the masonry jambs of each opening, the channels were employed to hold the edges of the glass block panels and to allow for the insertion of a Fiberglas expansion strip between the panel and the masonry opening.

Also salvaged from the original sash were several of the ventilating sash. Here, again, salvaged angles were employed with which to construct new metal frames for the sash which were then installed in the glass block panels.

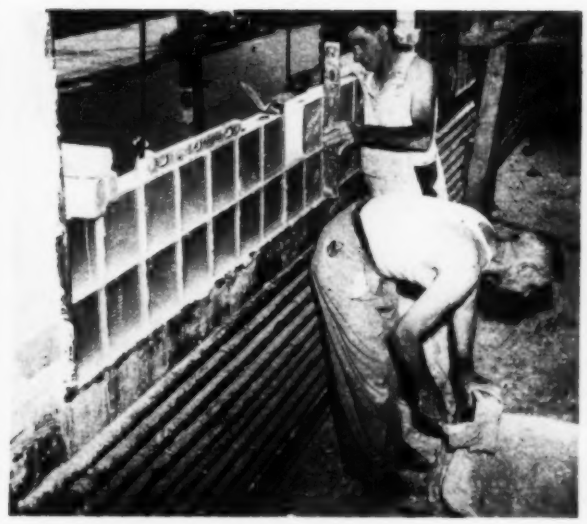
The glass block panels serve several functions. Of primary importance is the fact that they seal the space against noise, dust and heat transmission. Of nearly equal significance is the vast improvement in the appearance of the new office area, and the flood of evenly distributed and diffused daylight provided throughout. Being virtually an all-glass material, the glass blocks had the further advantage of being readily available without priority. Except for exposed edges of metal channels and ventilating sash, no metal needed repainting.

The installation of the glass block panels was followed by the application of a coat of Sprayoflake acoustical insulation to the ceiling and ventilating ducts hung from it. The wood floor, in poor condition because of previous machines, was covered with hardwood strips and surfaced with resilient Mastipave panels. A hollow terra cotta tile and plaster partition was then erected separating the newly created office space from the manufacturing space adjoining. Interior partitions of wood and glass subdivide the office space.

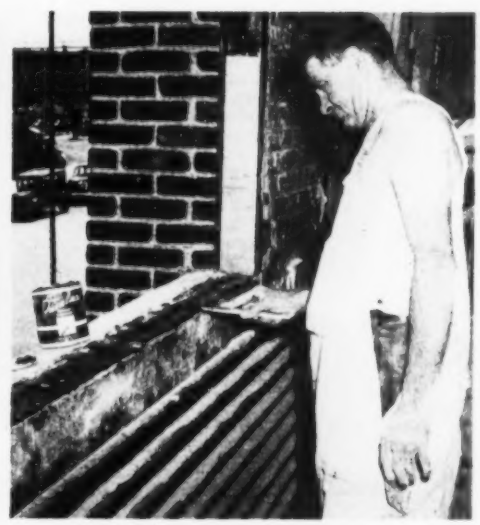
Considering the improvement in appearance and working conditions of the new space, the cost was relatively modest. According to production engineer Gulit, cost of removing old sash and installing nine glass block panels was approximately $3,000.



WINDOW AREAS from which old factory-type sash has been removed, are closed with panels of glass block, sealing space against noise, dust and heat transmission.

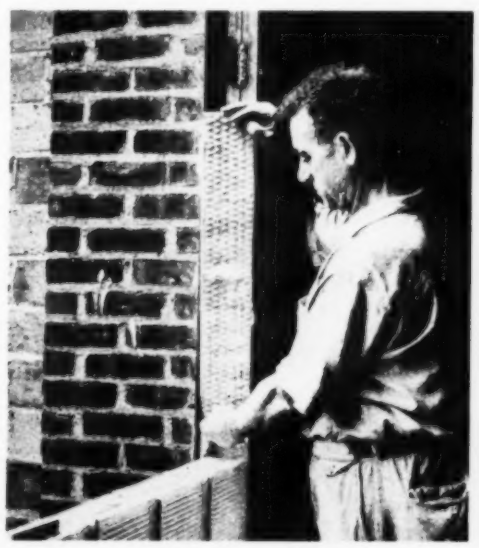


INSTALLATION OF GLASS BLOCK requires no special skill that competent masons do not possess. Joints must be well filled with mortar and blocks, measuring 8x8x4 in., must be kept plumb as panel rises.



MOISTURE SEAL along sill of fenestration area is provided by layer of special asphalt emulsion. A mortar bed for first course of blocks is then troweled over this waterproof coat.

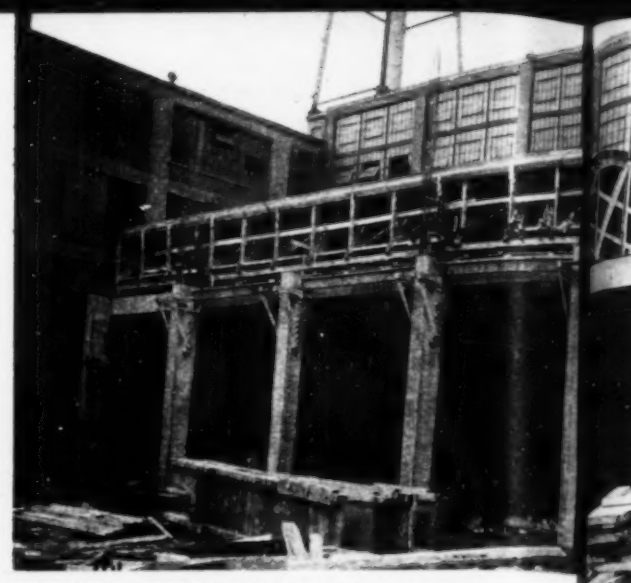
CALKING COMPOUND is forced along edges of panel to seal it against moisture and air penetration.



JAMBS FOR NEW GLASS BLOCK PANELS consist of light metal angles salvaged from old sash and spot welded to form channel into which edges of block fit. Strip of Fiberglas is inserted between blocks and channel to absorb movement and vibration.

ADJUSTMENT OF HEIGHT OF OPENING to accommodate glass block panels should be made at sill, either by building up with brick or channeling out existing masonry. Adjustments in width are most easily made by varying depth of chaces that hold panel in place.

PLANT BUILDING ADDITION 1,127 FT. LONG comprises three bays, each covered by concrete arch roof. Forms are in place for 100-ft. arch-roof section at left. Crawler cranes deliver concrete to 3x2-ft. concrete columns.



SECTION OF ARCH FORM 100 ft. long rides on track supported by crane-rail brackets on columns. Form is surfaced with ⅝-in. plywood panels against which concrete is poured.

Industrial Plant Addition Uses

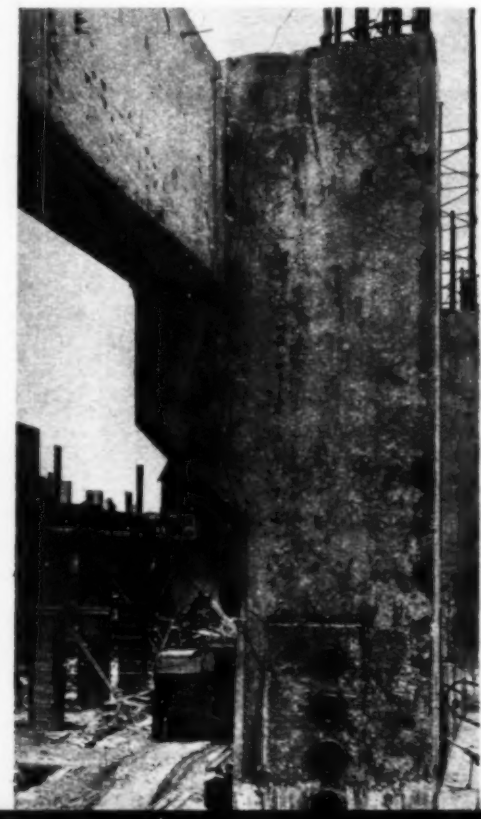
USE OF CONCRETE has saved many tons of steel in constructing arched-roof additions to existing buildings in a Westinghouse Electric & Manufacturing Co. plant. Another factor that determined the practicability of this design was the satisfactory and adequate local supply of sand, gravel, cement and brick and an ample quantity of available labor. The structure consists of three aisles. The central aisle is 55 ft. wide and 1,127 ft. long. It is flanked by two parallel aisles, one on the east side 55 ft. wide and 950 ft. long, and one on the west side 36 ft. wide and 1,127 ft. long. Three overhead cranes traverse the length of each bay.

Reinforced concrete columns, 3x2 ft. in section, were cast integrally with the footings and spaced 25 ft. apart. Brackets cast on the sides of the columns sup-

CONCRETE FOR ROOF ARCH is delivered by bottom-dump bucket raised by long-boom Speedcrane and discharged into hopper at end of runway atop forms whence it is carried to place in two-wheel buggies.

WOOD ARCH FORM 100 ft. in length is moved along track carried by crane-rail brackets on columns.

BRACKETS ON COLUMNS (below) carry crane girders. Sleeves in columns are provided for electric conduits.



STEEL REINFORCEMENT of ½- and ⅜-in. bars is placed in arch roof forms. Reinforced-concrete ribs extend across roof shell at 50-ft. intervals.

100-Ft. Movable Forms on *Concrete Roof Arches*

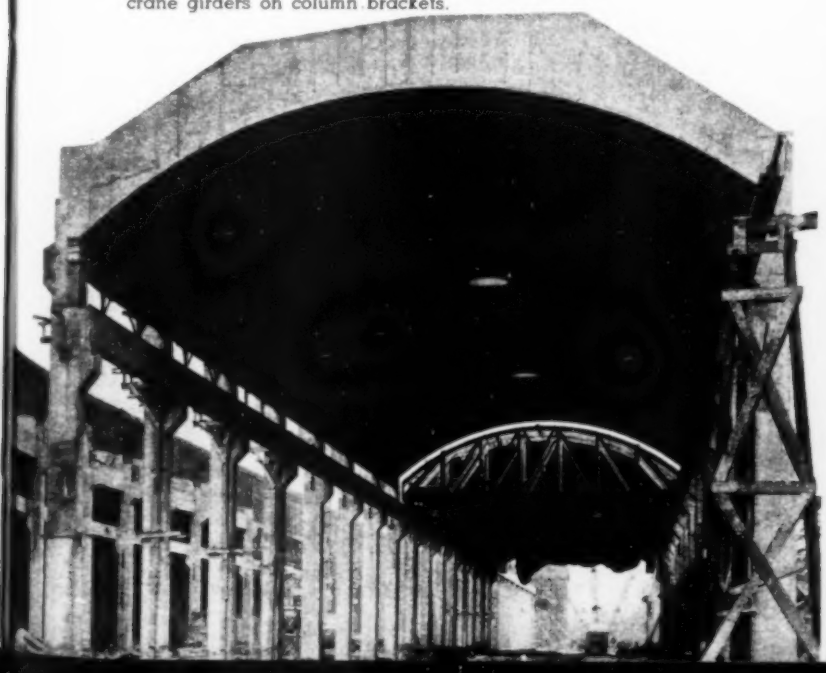
port the reinforced-concrete crane girders. The columns continue upward for support of the girders forming edge members of the arched concrete roof shell.

Unusual feature of the construction was the use of movable wood forms for the concrete arch-type roof, which was poured in 100-ft. sections. After the concrete hardened, the wood form was moved along on a track for the next pour. By providing reinforcing frames across the top of the roof shell, the arched ceiling is free from all obstructing ribs.

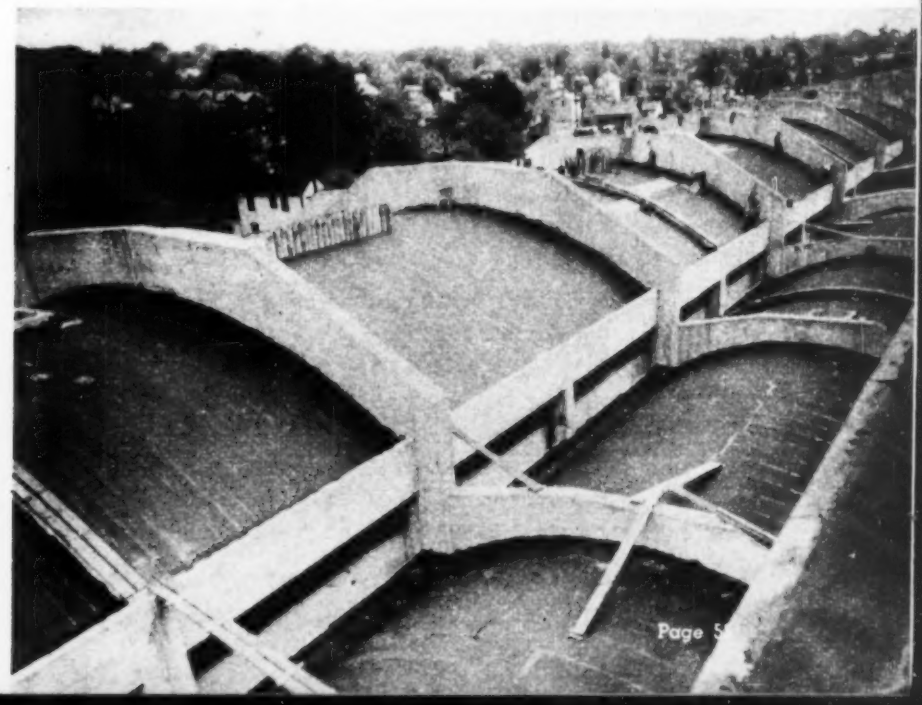
Longitudinal concrete beams carry the arched concrete dome, and the transverse frames formed above the roof are used to transmit stresses from the thin shell. Each 100-ft. section has a transverse roof frame 25 ft. from each end and 50 ft. apart, thus forming a support for the 25-ft. cantilever of the arch shell each way. A 9x16-in. concrete rib reinforces the end of each 100-ft. section.

THREE BAYS OF STRUCTURE are in various stages of construction. Aisle at left is covered with concrete arch roof. On center bay arch form is being set to receive concrete. In center of photograph are 3x2-ft. concrete columns carrying crane-rail brackets which support forms on track.

THICK TRANSVERSE RIBS (below) reinforce concrete arch shell at 50-ft. intervals. In rear a 100-ft. section of arch form is shown supported by crane girders on column brackets.



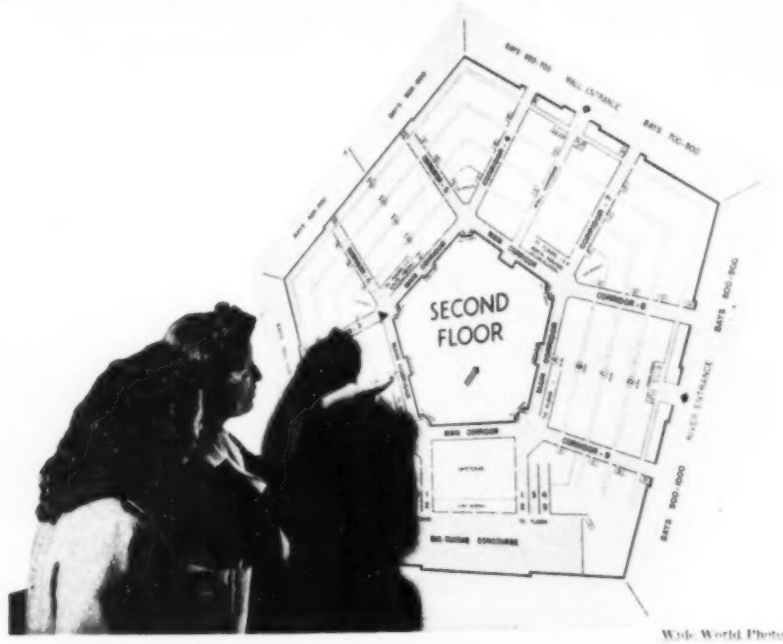
CONCRETE RIBS (below) reinforce roof shell of 1,127-ft. long, three-bay addition to plant.



"YES, WE HAVE *SOME* BANANAS," say these native vendors as they squat alongside of road offering tropical fruits for sale to road construction force of American contractor building defense project at island base. Corps of Engineers Photo

"GONE TO WAR" read placards on concrete pedestals which formerly carried two ancient, one-cylinder rollers, relics of earlier road-building days, at entrance to plant of Austin-Western Road Machinery Co. at Aurora, Ill. Two machines, each weighing 10 tons, represented by "phantoms" in photograph, were contributed by company to national drive for metal scrap urgently needed for war.

Job oddities



Wide World Photo

TO GUIDE OFFICE WORKERS of War Department who are moving into their new quarters in 43-acre Pentagon building in Arlington, Va., across Potomac River from Washington, D. C., huge map shows location of main and auxiliary corridors. Immense structure, to accommodate from 25,000 to 30,000 occupants, was built under direction of Corps of Engineers by three contractors: John McShain, Inc., Philadelphia, Doyle & Russell and Wise Contracting Co., Richmond, Va.

UNUSUAL JOB AT RIVER CROSSING (below) on route of Alaska Highway is performed by Caterpillar diesel tractor, equipped with LaPlant-Choate trailbuilder. Outfit deepens channel to provide for floating of pontons to carry bridge.

On-the-Job Maintenance KEEPS CONVEYOR BELTS ROLLING

By **WILLIAM S. RICHARDSON**, *General Manager, Industrial Products Division, The B. F. Goodrich Co., Akron, Ohio.*

WILLIAM S. RICHARDSON

CONVEYOR-BELT MAINTENANCE has taken on new significance and importance in recent months. Uncle Sam can't spare the rubber, and he can't spare the time that conveyor-belt failures cost.

Some idea of how important conservation is, from the standpoints of production speed and rubber need, is seen in these facts: (1) Movement of hundreds of millions of tons of ore, stone, gravel, concrete, coal, minerals and aggregates depends on these flowing ribbons of rubber, to say nothing of the manufactured products and foodstuffs moved by the same means; (2) in normal years about 5,000 tons of rubber goes into conveyor belt manufacture—equivalent to 4 percent of all the nation's rubber other than that used in tires.

Variety in the range, size and type of conveyor installations leads to what is probably the most general word of caution that can be uttered about conveyor-belt maintenance, namely, that the man in charge of maintenance have a thorough understanding of the "custom-built" nature of his particular installation and of the reasons for the selection of speed, spacing of idlers, type of take-up, construction of belt, and other factors that entered into its design. Analysis and understanding of the reasons for all these component factors in a properly "tailor-made" installation will go far toward assuring intelligent and alert maintenance treatment.

Composition of Belt

As a prerequisite to intelligent maintenance of conveyor belts, the fundamental characteristics and functions of the two elements of the belt—cotton fabric and rubber—should be kept in mind. Fabric supplies all the structural strength; it does all the work in pulling and supporting the load. Rubber supplies no structural strength. On the other hand, the cotton is almost powerless to resist abrasive wear, cutting blows, rot and corrosion, while the rubber with which the cotton is covered and impregnated is highly resistant to all these damaging conditions.

In general, these injurious conditions, extraneous to the actual load-carrying service of the belt, are of far greater effect in determining the life of the belt than are the tons transported or the cumulative mileage traveled by the continuous belt. Let us look at the most troublesome sources of damage and the most effective preventives.

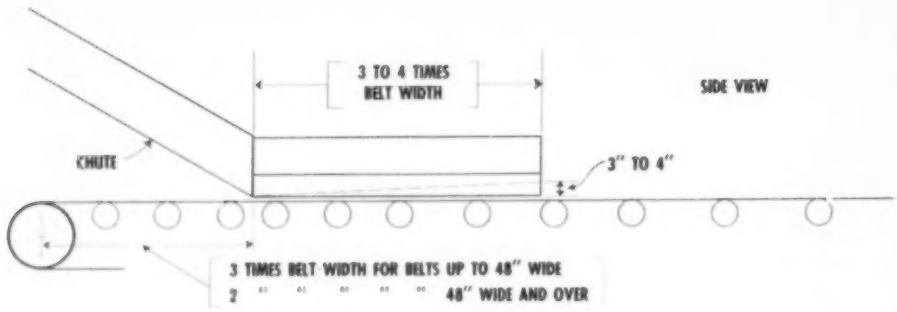
Wear at Loading Point

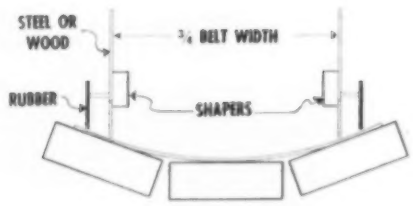
Heaviest wear from what we might call natural causes occurs at the loading point, where material to be moved drops upon the belt. Our objective, then, should be to make all conditions at that point as smooth and shock-free as possible.

Pursuing that objective, an ideal loading chute should be so placed that the material leaves the chute moving in the same direction as the belt, and as nearly as possible at the same speed. Loading at an angle to the travel of the belt not only increases abrasive wear on the cover, which corresponds to the tread in an auto tire, but will, if not centered, cause the belt to climb the idlers, resulting in damage to the edge.

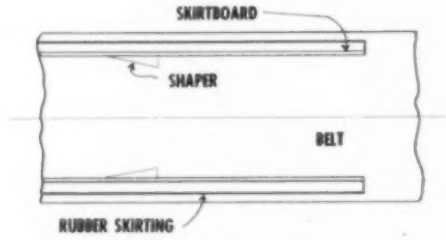
Dropping of lumps against the rubber surface is responsible not only for a large percentage of the wear but also for cuts, gouges and fabric breaks that lead to trouble. This pounding is aggravated greatly if the chute discharge is located directly over a pulley or an idler, producing an effect tantamount to a hammer or an anvil. If it is impossible to avoid such a location, damage to the belt may be minimized by covering idler pulleys with a ½-in. to ¾-in. thickness of soft cushion rubber and mounting the idler frame on shear-type mountings. The best method of insuring proper adhesion is to send the pulleys to the rubber factory to have the rubber vulcanized to the steel rims.

Common devices to reduce the excess wear caused by heavy, lumpy material—aside from the matter of position of the



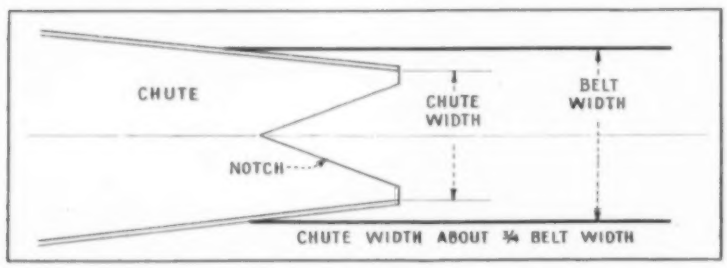


END VIEW

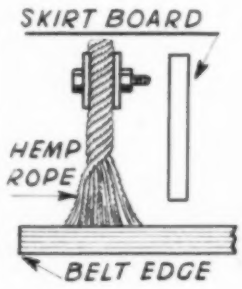


TOP VIEW

GOOD PRACTICE in skirt-board design is indicated by this installation, which has proved unusually successful in forming maximum load of run-of-mine coal on 48-in. conveyor. Lower edge of each skirt-board is mitered (as shown by dash line in side view) to increase clearance in direction of belt travel, permitting trapped lumps to escape without gouging belt cover. Additional rubber outside skirting prevents spillage of any material that passes under mitered lower edges of skirt-boards. Special shapers, consisting of wedge-shaped lugs attached to inside of skirt-boards, are found valuable in guiding lumps toward center of belt. Location of these shapers must be determined by experience.



NOTCH IN LOADING CHUTE allows fines to drop on belt ahead of lumps, forming cushion which reduces shocks and wear on belt when larger pieces fall.



SECONDARY SKIRT (right) made up of short lengths of hemp rope clamped between steel strips provides additional protection against spillage of material escaping under skirt-boards, as illustrated in this sketch, courtesy of E. LEET, The Beech Bottom Power Co.

chute — are mechanical arrangements that permit fine material to fall on the belt first, ahead of the coarse materials, thereby providing a sort of cushion. This result is commonly accomplished by a screen or grating in the bottom of the chute, or by a grizzly. An effective and inexpensive method consists of a V-shaped notch in the lip of the chute, so that the larger pieces are carried along farther than the small particles.

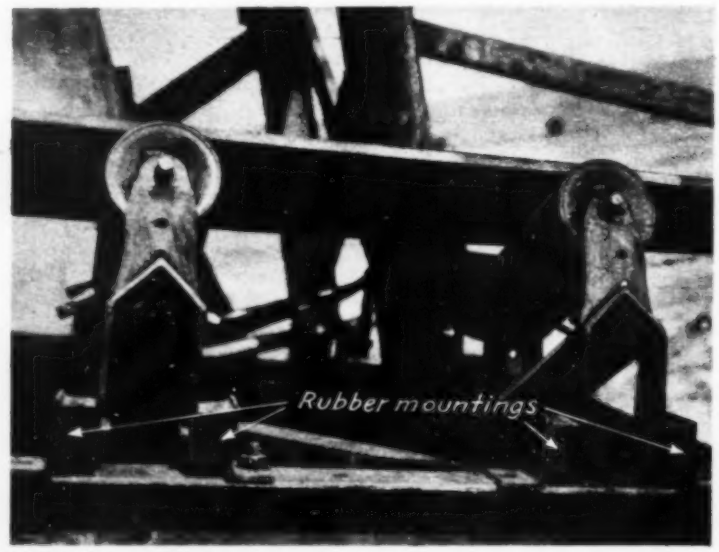
Another common form of wear at the loading point is due to improper clearance between the belt and the lip of the chute or the bottom edges of the skirtboards. No stationary parts should be permitted to come in scraping contact with the belt surface, nor should material be permitted to wedge between the belt and the chute or any fixed part of the installation.

Impact on Idlers — Effect of impact at loading points is quite generally understood, but there is another severe condition which is not so universally recognized: Belts carrying large lumps at high speed are subjected to severe impact as they pass over each idler. In fact, it is not uncommon for belts to be subjected to even greater impact at the idlers than at the loading points.

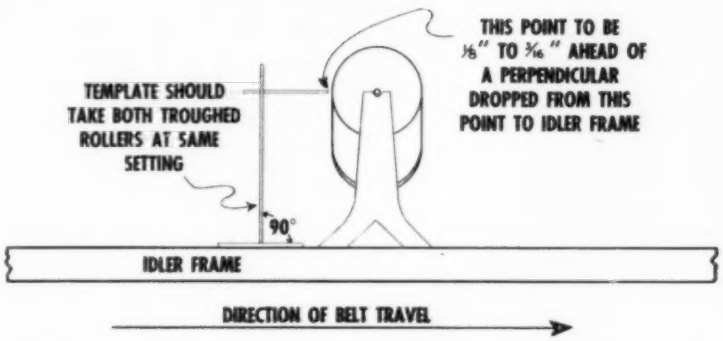
Ordinarily this condition can be met by the use of a belt which gives a maxi-

SPECIAL IMPACT CARRIER of Stephens-Adamson type replaces conventional steel idler rolls with small pneumatic tires which are permanently sealed to require no further inflation. Rubber tires are effective in absorbing impact shocks and protecting belt cover from cutting, gouging and abrasion. For additional protection, rubber impact mountings may be used in conjunction with pneumatic-tired idler.

SEVERE POUNDING on belt results from location of loading chute directly over tail pulley. As rocks fall on to belt immediately over steel pulley, effect is equivalent to belt's being hammered on an anvil, and rubber cover is badly cut and gouged. Pounding is almost as severe if chute discharges directly over idler pulley. This installation should be changed to put discharge about 18 in. ahead of idler.



SUSPENDED IN RUBBER BLOCKS, special shock-impact mounting of idler frames permits idlers to give slightly instead of standing rigid under belt subjected to loading shocks, thus cushioning effect of impact and saving wear on belt cover. Size of rubber mountings required depends on weight of material carried by conveyor; length of mounting is varied according to requirements, while width remains constant.



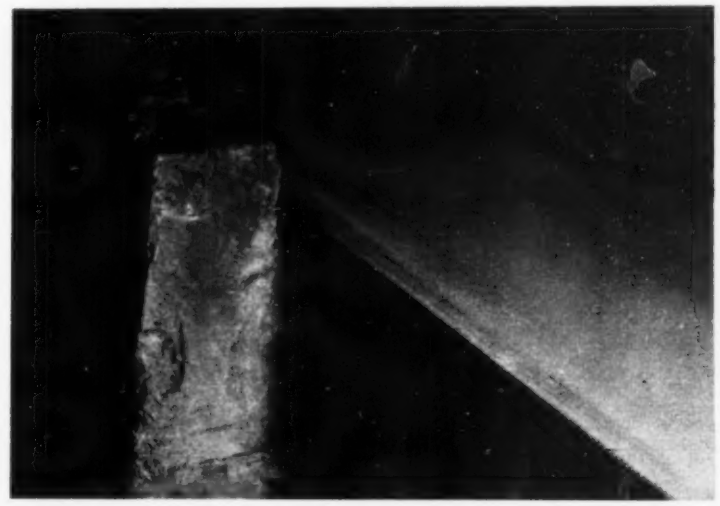
SLIGHT TILTING FORWARD of idler carrier helps to keep belt running straight in its course. Sketch indicates proper degree of tilt; too much tilt may cause lack of full contact or excessive wear on pulley side of belt.

SWINGING BAFFLE BARS (right) suspended at discharge end of loading chute reduce velocity of sliding material and permit it to move easily on to belt. Weight and number of bars have to be carefully adjusted to avoid slowing up feed too much and thereby choking chute. In this installation, special arrangement of bars corrects one-sided loading which otherwise would result from angle of chute. Cable threaded through bars a few inches from top serves dual purpose of increasing shock resistance and preventing any bar which might be torn loose from dropping on belt and being carried along to crusher. Hardwood logs have been used in same manner for swinging baffles.

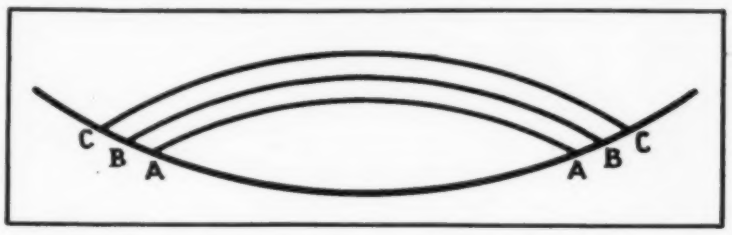
PROTECTIVE DECKING covering entire return side of belt prevents falling lumps from getting between belt and pulley and causing serious injury to belt fabric.

RETURN IDLERS, permitted to slide along shaft, allow belt to sag several inches over one edge, throwing belt completely out of line and forcing it to rub against wood side rail.

SERIOUS LACERATIONS in belt cover result from rubbing on side boards. Skirt-boards and side boards along entire length of belt should be used only where absolutely necessary. Yielding material like old belt causes less damage than wooden boards, but even it should not be allowed to rub constantly against belt.



RUBBING AGAINST CONCRETE PIER as result of crooked running, protecting rubber is worn away completely at edge of belt and 2 in. in from edge on pulley side, eventually permitting entrance of moisture and breakdown of fabric.



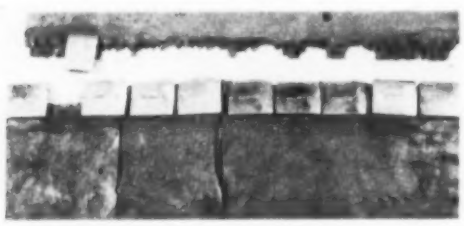
CARRYING LARGER LOADS at reduced speeds saves belt wear, as illustrated by this cross-section of belt delivering material at uniform rate but at three different speeds:

AA=Size of load at 500 ft. per min. **BB**=Size of load at 400 ft. per min. **CC**=Size of load at 300 ft. per min.

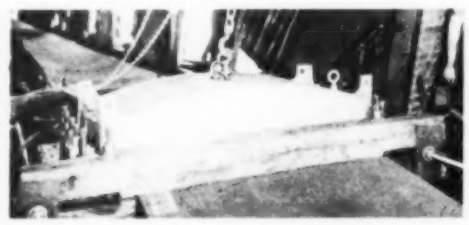
CLOGGING WITH SAND prevents middle idler from receiving its share of grease, with resultant freezing to shaft and wearing of steel rim. Sharp, jagged edges of worn idler will rapidly ruin belt structure.

CROOKED RUNNING caused by one-sided loading 200 ft. away is ruining edge of this sand conveyor belt. Large percentage of premature belt failures are traceable to crooked running, and it pays user to devote time and effort to finding and correcting cause.

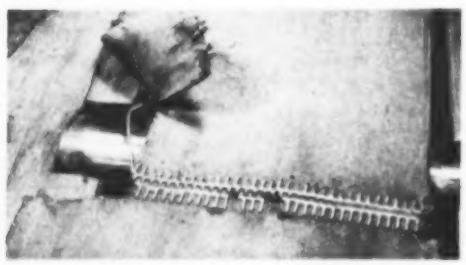
FROZEN TO SHAFT as result of lack of grease, steel idler roller is worn completely through by traveling belt, leaving sharp edges to macerate rubber cover and fabric of belt carcass.



TOO THOROUGH CLINCHING of belt hooks has damaged carcass of this belt, causing rupture of strands of cotton yarn.

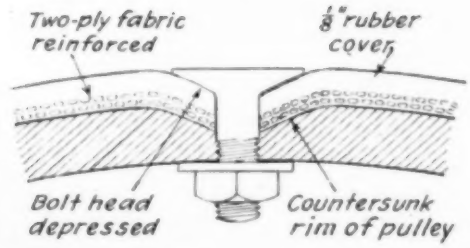


PORTABLE ELECTRIC VULCANIZER cures joint at belt splice after application of belt to pulleys. Portable vulcanizing equipment, available through distributors, saves maintenance time and expense by making it possible to vulcanize belt splices in field.



STEEL PIN OF BELT LACING is bent back by rubbing on an obstruction, permitting fabric to rip at its weakest point, a longitudinal seam.

EXPOSURE TO SUNLIGHT AND WEATHER causes deterioration of rubber cover on this belt, handling non-abrasive material.



RUBBER LAGGING on drive pulley increases coefficient of friction between belt and pulley face about 20 percent, provided surfaces are not extremely wet. Lagging made especially for purpose is better than scraps of old belt, because special lagging has uniform thickness of rubber cushion into which bolt heads may be sunk, as indicated by sketch, preserving smooth driving surface. Lagging must be renewed from time to time to keep bolt heads from projecting and cutting belt.

mum amount of cushion to absorb impact. Installation of idler carriers which are mounted in rubber in shear, allowing the idlers to give slightly instead of standing rigid under the shocks, is a means of relieving severe impact either at loading points or throughout a conveyor belt system.

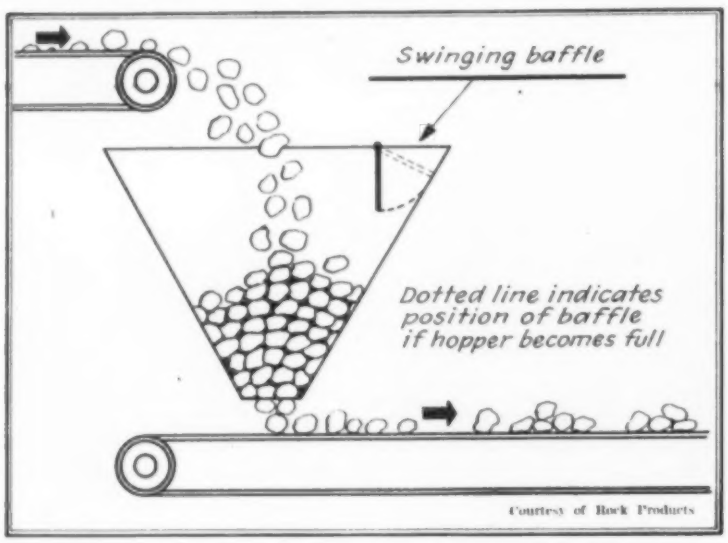
Here is a truism that might well be borne in mind as a general principle relating to all conveyor-belt operation: "Big lumps make hard service out of otherwise easy service."

Skirt-Boards

In spite of the most careful placing, skirt-boards frequently become a cause of excessive wear on the belt cover. They should not come in contact with the belt at any time—either when it is loaded or empty—and they should be set in such a way that spaces between the boards and the belt and between the boards themselves grow larger in the direction of belt travel. This setting of skirt-boards permits misplaced pieces of material to work free rather than to wedge tightly against the belt, with resultant abrasion or gouging of the cover.

Skirt-boards are usually necessary

(Continued on page 86)

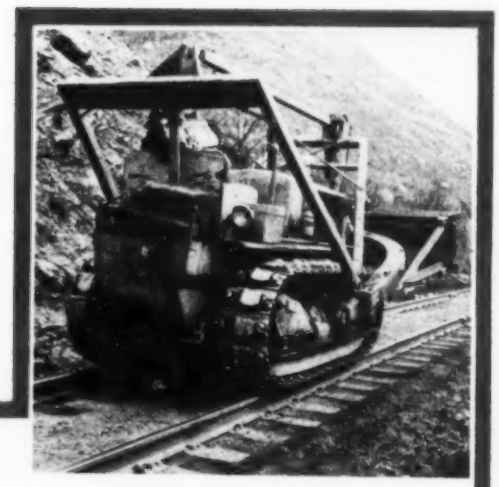


TO PREVENT OVERFLOW of loading hopper and dropping of excess material on belt, swinging baffle (pushed upward as hopper becomes overfull) actuates switch to stop conveyor before any damage can be done.

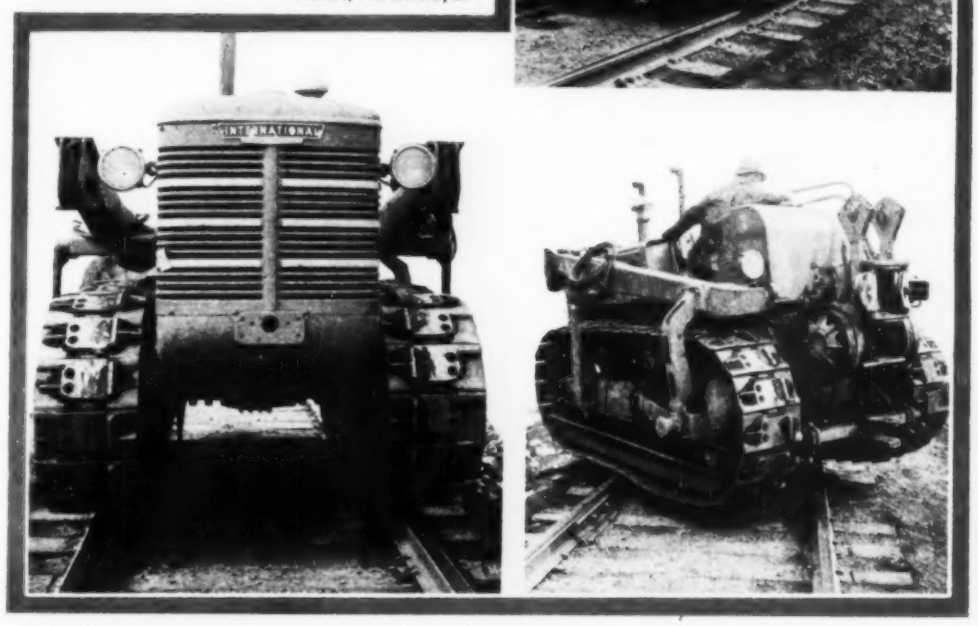
SERIES OF PIVOTED BARS arranged at intervals along inclined conveyor prevent roll-back of lumps. Bars are so hinged as to swing forward freely but are prevented from swinging backward. Dislodged lumps (a source of damage to equipment and danger to workmen) are caught by bars and are started again up conveyor.

Special Track Shoes

On Crawlers Enable Tractors to Ride Rails on Railway Maintenance Job



Photos, The Em Kayan



FLANGED TRACK SHOES are attached to crawler treads of International tractor, enabling machine to "walk" along railway rails and haul equipment required for maintenance work at speed of 12 mph. There is a 2-in. tolerance between gages of rails and flanged shoes on tractor tread plates.

WITH THE AID of special track shoes attached to the crawlers of tractors to provide flanged treads, as illustrated in the accompanying photographs, equipment of the railroad division of the Morrison-Knudsen Co., contractor, of Boise, Idaho, was moved along the rails of the Union Pacific R.R., on a project for improving 150 mi. of right-of-way in the vicinity of Evanston, Wyo. Operations involved restoring and widening embankments, re-sloping cuts, ditching and excavating for new drainage channels.

The complement of mobile equipment for carrying on this work consisted of four ¾-yd. draglines, six tractors equipped with bulldozers, specially built narrow-gage scrapers and motor patrol units. For moving the draglines, trailers mounted on flanged wheels and equipped with ramps for quickly loading and unloading the heavy machines, were provided. The entire equipment train can "walk" down the railroad track pulled by tractors fitted with the special on-and-off track plates which were devised by Murray E. Burns and George Bonnell, superintendents in the Morrison-Knudsen organization. This method of on-and-off track transport makes unnecessary the use of the usual railroad locomotive and work train, thereby eliminating stoppages or delays to regular railway traffic. Special gears on the tractors enable them to walk at a speed of 12 mi. per hr., pulling the dragline and trailers behind. There is a 2-in. tolerance between the gage of the tractor shoe flanges and the standard gage of the railway track.

HAULED ALONG RAILWAY TRACK. equipment train for maintenance of right-of-way comprises International TD 18 tractor fitted with flanged shoes and carrying Bucyrus-Erie bulldozer, Northwest dragline on flanged wheel trailer and second trailer carrying ramp for loading and unloading dragline.

POWER TRANSMISSION LINE POLES on U. S. Bureau of Reclamation's Parker Dam power project in California are prepared for attachment of cross-arms by portable, electrically powered gaining machine. In photo at left, machine has made one pass down and back to complete gain. Photo in center shows machine raised to reveal cutting blades and completed gain on one side of pole. Note that gaining machine is separate from metal guides. Photo at right shows gain completed and Thor electric drill boring through-bolt holes for attachment of cross-arms. Use of double square insures accuracy of hole drilled.

LARGE TREE IS FELLED (left) with Atkins-Hassler electrically-operated chain saw weighing 85 lb. in 46-in. size. Tool is powered by electric motor developing 10 hp. in cut. Cutter chain tightener and outer handle assembly are of special design to insure even tension on cutter chain at all times, regardless of type of sawing. Saw cuts shavings like those made by planer. Side-cutter teeth first cut across end grain and then router teeth cut shavings loose, departure from practice of forcing sawdust ahead of raker teeth.

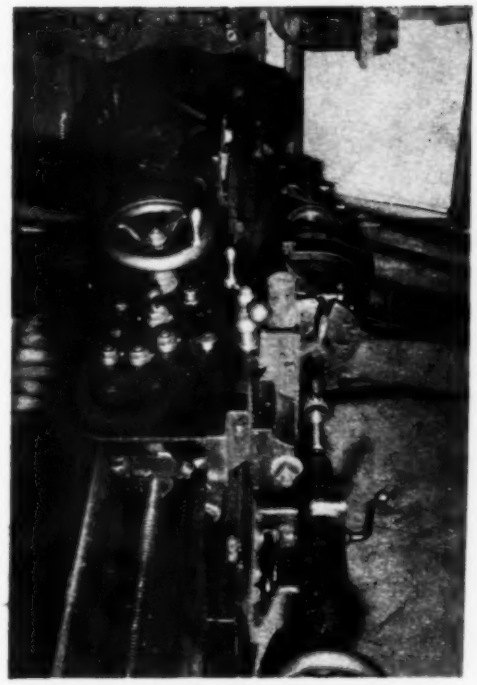
HOW They Did It

CONSTRUCTION DETAILS

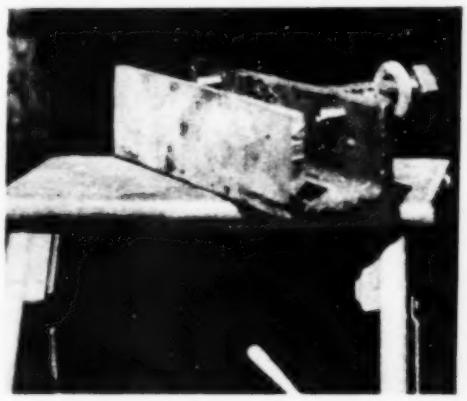
For Superintendents and Foremen

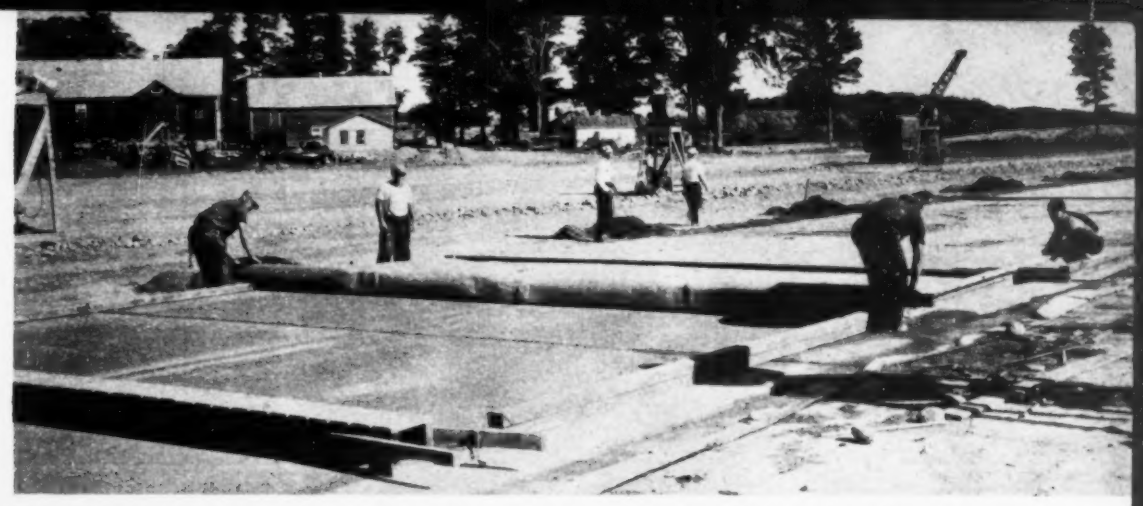
TRACTOR SHOVEL (below) excavates in close quarters under street decking at Jackson-Van Buren station of Chicago's State St. subway on contract of Robert R. Anderson Co. Spoil is deposited where it can be reached by clamshell crane operating on street deck.

GLUE GUN (below), developed as aid in prefabrication of timber units for mass house construction, is designed with capacity of 2 qt. to supply exactly right amount of adhesive in strips 1 in. wide. Flow of glue from Laucks gun is adjusted to eject continuous band, whether applied vertically or horizontally. One filling of barrel is sufficient for 408 lin. ft. of studding and if self-bonding, water-resistant glue is used, slight, uniform pressure provides permanent bond between 2x4's and wallboards.



EQUIPMENT MAINTENANCE AND REPAIR are attended to regularly in shops of The Austin Co., contractor, at Elizabeth, N. J. Above is shown lathe rigged for slotting keyway in shaft or axle. Below is illustrated clamp for holding shaft to receive slotted keyway. Shop superintendent is Earl Sweet.





FOR CURING CONCRETE forming six 25-ft. wide strips of paved runways 150 ft. wide at Army air depot somewhere in Eastern States, tough, waterproof Sisalkraft paper is unrolled on freshly poured surface to retard evaporation of water from mix. Project included 15,000 lin.ft. of 450-ft. wide paved surface in three runways laid out in form of triangle. Corps of Engineers Photo

DRINKING WATER TRUCKS are operated by Cahill Engineers, Ltd., to serve construction workers on Bushnell General Hospital project at Brigham City, Utah. Tank of 350-gal. capacity is mounted within box protected with 6 in. of insulating material. Space between box and tank is packed with 600 lb. of ice to cool water without coming in contact with it. Fire hose from tank distributes cool water to insulated containers in field. Two trucks serve 2,500 men working on area of 300 acres.—Photo from W. W. LIPPMAN, project manager, Cahill Engineers, Ltd., general contractors, Brigham City, Utah.

WOODEN STILTS (below) save time of electricians wiring newly built army barracks and messhalls at Fort Lewis, Wash., by enabling them to reach ceilings without resort to ladders. After men took few "test flights" and grew accustomed to height-increasers, they pronounced stilts O.K. Wide World Photo

TIGHTENING OF NUTS (below) on Crosby wire rope clips on cableway at Shasta Dam, U. S. Bureau of Reclamation project in California, is speeded up by using Ingersoll-Rand air-operated impact wrench instead of ordinary hand wrench.

Get the JUMP on trouble!

KEEP 'EM PROPERLY SERVICED. . .

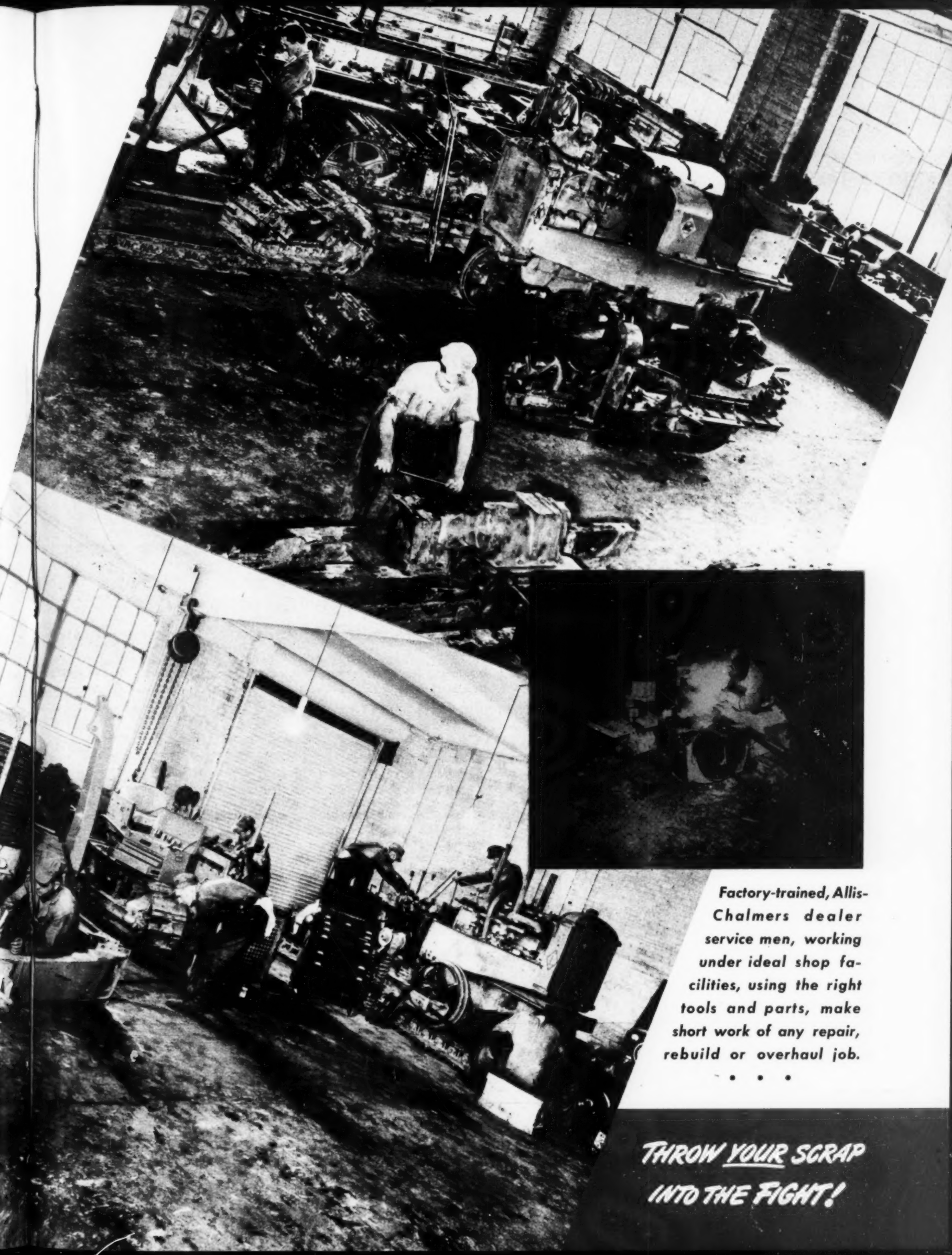
Trouble's ugly head will rear "as sure as shootin'" if your equipment is neglected. A machine run even one day longer than it should will be many times as expensive to repair . . . cost you plenty in lost production, too, and require considerably more critical material.

Keeping your equipment properly serviced will prolong its life, maintain production, cut depreciation and operating cost and increase your profits.

Close to you — as near as your phone — no matter where you are . . . is an Allis-Chalmers dealer, ready, fully-equipped to serve you. He will be glad to make frequent check-ups, tell you the exact condition of your outfits . . . let you know in advance what can be expected later. It's your guarantee against trouble! This is but one of the many valuable services offered to you by your Allis-Chalmers dealer. He is ready at all times to expertly handle your repair, rebuild or replacement work. His staff of skilled, factory-trained mechanics, using genuine parts, his knowledge and experience are always at your disposal. *Let him help you get the jump on trouble.*

Call your Allis-Chalmers dealer today!

ALLIS-CHALMERS



Factory-trained, Allis-Chalmers dealer service men, working under ideal shop facilities, using the right tools and parts, make short work of any repair, rebuild or overhaul job.

• • •

THROW YOUR SCRAP INTO THE FIGHT!

Preventive WILL KEEP Trucks

Official O. W. I. Photos

PRACTICAL ADVICE on how owners and operators of motor trucks may prolong the useful life of their machines during the war emergency by "preventive maintenance" has been offered by the Office of Defense Transportation, Washington, D. C., in its effort to conserve almost irreplaceable equipment and save gasoline, oil, parts and tires. The fact that most of the nation's five million trucks now are working harder and longer hours than ever before makes proper maintenance a patriotic duty, inasmuch as motor trucks constitute "an irreplaceable commodity" essential to the war effort.

Getting down to practical details of

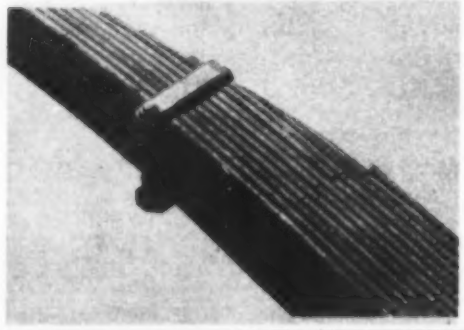
(Continued on page 113)

Ruined by Neglect!

This valve cannot be salvaged. It was ruined because the engine was permitted to run without attention long after a valve grind was needed. The need for valve reconditioning would have been quickly determined if a compression gage had been applied to the engine during a routine inspection.

A Twist of the Wrist Would Have Saved $50!

This radiator worth approximately $50 should have lasted the life of the truck. It lasted less than half the truck's normal life. Someone neglected to tighten the nut holding the fan in adjustment. A routine inspection would have shown the fan to be loose and consequent adjustment would have saved this radiator.



Loose Spring Clips Cost $25!

The broken leaves in this spring were caused by loose spring clips. If the truck had been inspected, a competent mechanic would have detected the loose clips instantly. Thus, this spring would have been saved for indefinite service and an expense of approximately $25 would have been prevented.

Too Much Heat Cracks Drum

The brake shoe adjustment was faulty, causing the drum to overheat and crack. It should have given many more miles of service as is indicated by the fact that its mate is still running. This neglect cost the operator $31.

Inexcusable Waste of Rubber!

This tire gave less than half of its normal mileage. The edges show that it has not worn out in the normal way. Wheels out of line were responsible. A routine inspection would have disclosed this and many pounds of rubber would have been saved for useful mileage.

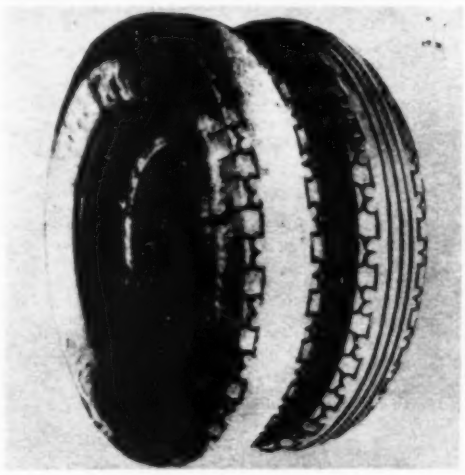
Damaged Rims!

Rims with bent or damaged flanges do not permit the tire to seat itself properly. This condition results in excessive chafing and early failure in the bead area of the tire (below). Faulty rim equipment should be replaced at once to save rubber.

Maintenance

AMERICA'S

Rolling

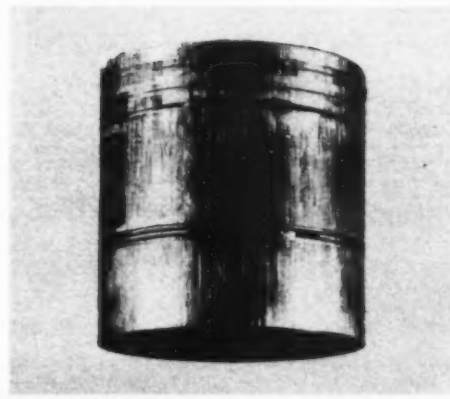


Match Duals Properly!

When dual tires are mismated (above) the larger tire carries most of the load and the smaller tire is just "along for the ride." This produces fast tread wear on the overworked tire and results in early failure. Tires which differ more than ¼-in. in diameter should not be mounted on the same set of dual wheels. Properly mated tires shown below.

This Neglect Cost Owner $200!

The rings on this piston were stuck, ruining the cylinder walls and making a complete rebuilding necessary. This condition was caused by faulty oil and could have been prevented by an oil change or a filter cartridge replacement. A routine inspection would have saved the overhaul job which cost $200.

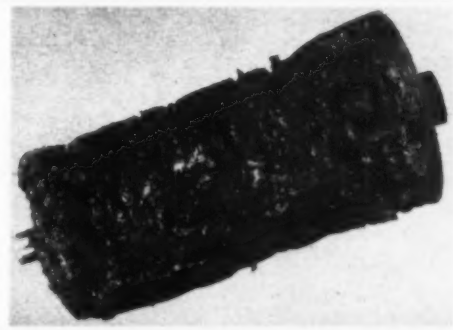


Overheating Caused This Waste!

This piston is scored beyond repair. The damage was caused by running an overheated engine. If the radiator had been flushed at reasonable periods, it would not have happened. The driver could have prevented this extreme damage had he shut off the engine when it began to overheat.

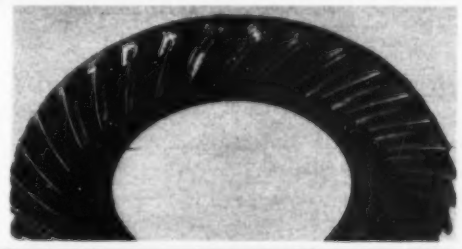
Another Waste of $200!

This filter cartridge is completely plugged up and useless — not only beyond the point of cleaning the oil, but also so dirty that it clogged the oil line, resulting in a complete engine failure. Under a Preventive Maintenance Plan it would have been changed long before and the owner saved a repair bill of approximately $200.



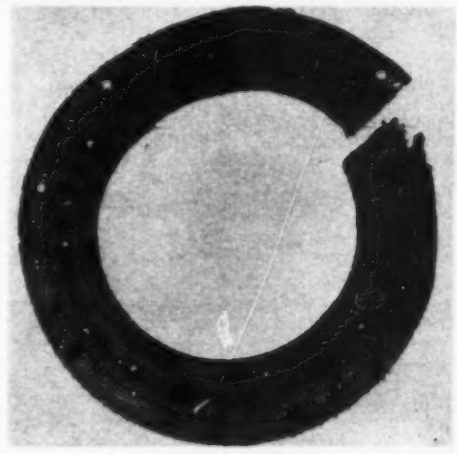
Wrong Lubricant Costs $80!

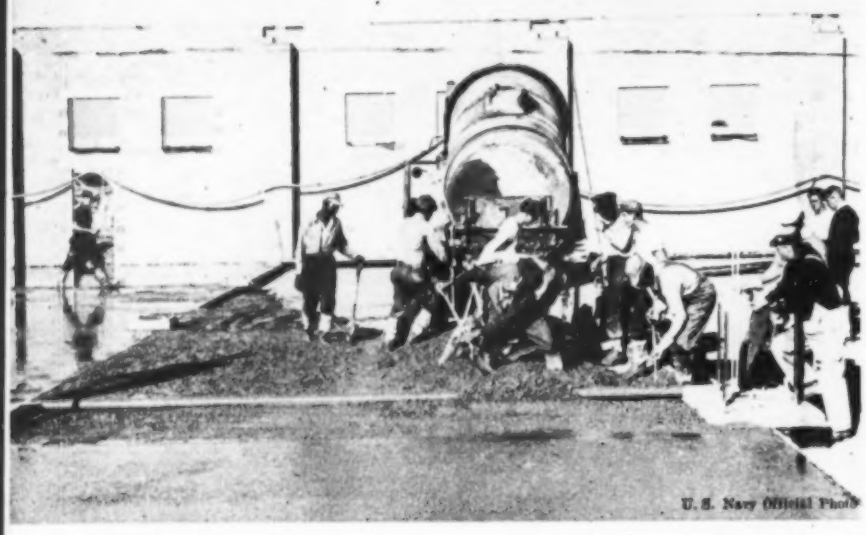
This ring gear is worthless because the mechanic on the job did not think it necessary to determine the correct lubricant to use for this rear axle. The wrong kind completely ruined the rear axle gears. Cost: Approximately $80.



Defective Linings are Costly!

Brake linings and clutch linings do not cost very much, and the charges for installing them are reasonable. But the cost of continuing to use defective linings is high. A simple adjustment or an easy replacement can save expensive repair jobs on clutch and brake systems.





U. S. Navy Official Photo

SAVING IN LABOR results from use of rolling pipe screed operated by two men to strike off concrete deposited by truck mixers and distributed by hand shovelers on earth subgrade between screed boards.

FOLLOWING POWER FLOATS. gasoline-engine-driven rotary trowels impart first trowel finish to concrete floors.

Vacuum Mats and Power Machines

Speed Concrete Floor Finish for Navy Warehouses

VACUUM PROCESSING, followed immediately by power floating and troweling, has expedited monolithic finishing on 55 acres of concrete floors in one-story warehouses constructed by the John W. Cowper Co., Inc., Buffalo, and Senior & Palmer, Inc., New York, contractors for the Bureau of Yards and Docks of the Navy Department on the new Naval Supply Depot at Scotia, N. Y. Nonreinforced slab 5 in. and 6 in. thick is laid on natural soil subgrade and after 10-min. processing with vacuum mats is finished with gasoline-engine-driven rotary floats and trowels. Behind these machines, hand finishers give the surface a hard troweling. No dust coat is applied.

WET CONCRETE is processed for 10 min. by vacuum mats which remove excess water from 6-in. slab. Mats are connected by hose lines to manifold hooked up to vacuum pump. U. S. Navy Official Photo

DRIED AND COMPRESSED by brief vacuum processing, concrete floor **(below)** is floated and trowled immediately by power machines, followed by hand finishers who give final hard trowelling to monolithic floor surface. U. S. Navy Official Photo

Benefits of Fast Finishing

By these methods, hand finishers are able to complete their day's work 2½ hr. after the final concrete is placed, a fact which allows concreting to continue until late in the afternoon. As a result of the extra time gained by the fast finishing method, a floor crew (including 15 finishers for the various operations of screeding, running power machines and troweling by hand) averages 48,000 sq.ft. of completed slab per day. Vacuum processing for the day is completed about 1 hr. ahead of the final troweling. Processing is facilitated by the operation of three truck-mounted vacuum pumps, each capable of serving a line of 65 vacuum mats extending across the full 200-ft. width of a building.

Favorable construction conditions contribute to the speed of the work. Floor concreting is allowed to proceed continuously over large areas without any break, thus eliminating the frequent moves which hamper operations on jobs where construction in alternate

(Continued on page 114)

Present and Accounted For···A PAGE OF PERSONALITIES

DISTINGUISHED SERVICE MEDAL has been awarded by War Department to COL. THEODORE WYMAN, JR., Corps of Engineers, "for exceptionally meritorious and distinguished service in performance of duty of great responsibility as District Engineer, Honolulu (H. T.) Engineer District, from Oct. 14, 1941, to March 15, 1942. Col. Wyman completed projects in South Pacific Area under extremely difficult conditions of supply and construction and "rendered service of great value to the defense of this and co-belligerent countries in the current World War."

U. S. Signal Corps Photo

VERNON L. GLOVER, since 1926 engineer of materials for the Illinois State Division of Highways, has been promoted to position of assistant chief highway engineer, succeeding M. J. Fleming, resigned. Mr. Glover's service with the state highway department dates from 1917.

ARTHUR W. BUSHELL is new deputy commissioner of Connecticut State Highway Department, having recently been promoted from his post of engineer of contracts and construction. Mr. Bushell began work with department in 1913 as an inspector.

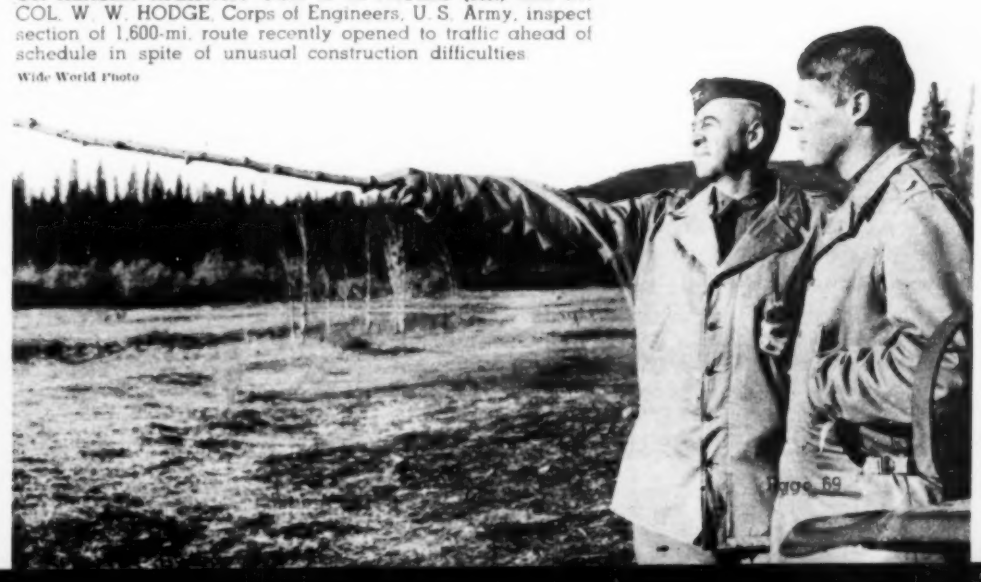
COL. EDWIN C. KELTON, Corps of Engineers, U. S. Army, formerly district engineer at Los Angeles, has been assigned to duty as director of construction of 500-mi. section of Pan-American Highway through Central America.

U. S. Signal Corps Photo

MARK P. WYNKOOP (below) is new state highway engineer of North Dakota, succeeding Z. E. Sevison, resigned. Veteran of first World War, Mr. Wynkoop has served with state highway department for 20 years as resident engineer, division engineer and construction engineer.

ON ALASKA HIGHWAY COL. E. G. PAULES **(left)** and LT. COL. W. W. HODGE, Corps of Engineers, U. S. Army, inspect section of 1,600-mi. route recently opened to traffic ahead of schedule in spite of unusual construction difficulties.

Wide World Photo



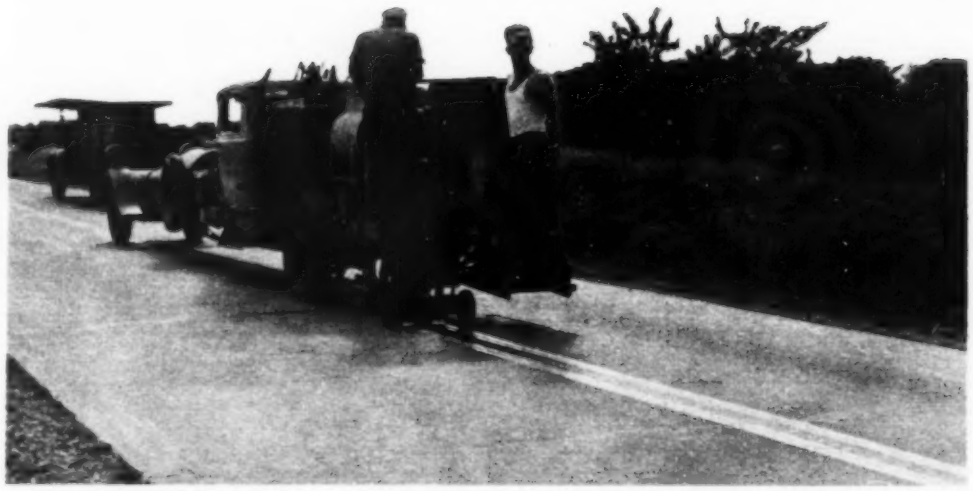
CONSTRUCTION MEN RECEIVE AWARDS

for reports on developments and applications of arc-welding in $200,000 Industrial Progress Program sponsored by James F. Lincoln Arc-Welding Foundation, Cleveland, Ohio. (Left to right) First Grand Award of $13,700 went to CAPT. C. A. TREXEL (CEC) U. S. Navy and A. A. MIRIKIAN, respectively director of planning and design, and designing engineer, Bureau of Yards and Docks, Navy Department, Washington, D. C., for paper on caissons for naval drydocks. Award of $2,700 was made to GLENN L. ENKE, assistant chief engineer, Utah-Pomeray-Morrison Company, Provo, Utah, for paper on girder-type highway bridges. Award of $1,500 was received by EMANUEL SCHEYER, assistant designing engineer, New York Board of Transportation, for paper on welded bents for subways.

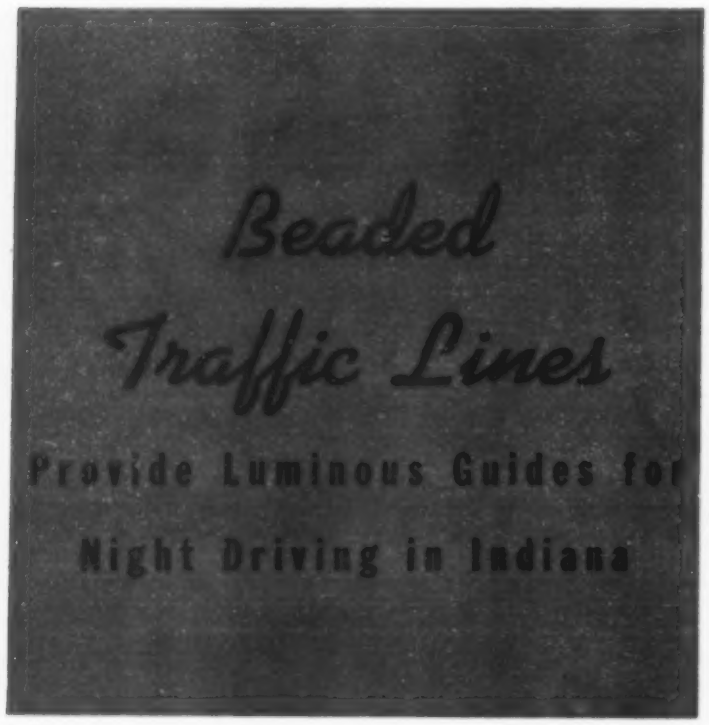
MILLIONS OF MINIATURE GLASS BEADS, smaller than a grain of sand, are an important factor in making night driving safer on Indiana's state highway system as they glow under the headlights of cars and warn the motorist that he is entering a no-passing zone where visibility ahead is limited.

These beads, spread on a special yellow paint binder which is applied parallel to the center line at points on heavily traveled roads where sight-distance ahead is less than 750 ft., represent another of the steps which the Indiana State Highway Commission is taking to increase motoring safety. This type of marking is expensive but is regarded as a good investment in the prevention of accidents.

The designation of "no-passing zones" was begun as a safety move by the High-



SPECIAL EQUIPMENT towed by truck marks yellow paint stripes on either side of centerline at speed of 10 mph. and then applies to them, while still wet, small glass beads to reflect light from headlights of cars and increase safety of night driving.



GLASS BEADS are poured into container at rear of striping machine and and applied through tubes on 4-in. wide strips of quick-drying yellow paint in "no-passing" zones.

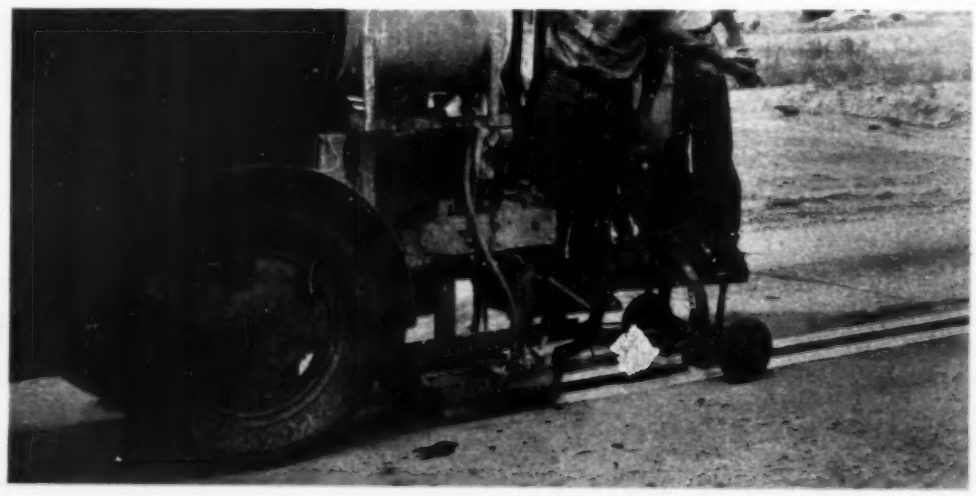
Photos, Indiana Highway Commission

way Commission in 1935 and two years later was incorporated into law by the General Assembly with penalties prescribed for violation of the marking. Originally a line of yellow paint was placed parallel to the center line to designate no-passing when it was on the driver's side of the center line. This painted line proved unsatisfactory due to poor visibility at night.

After considerable experimentation the highway engineers found that the miniature glass beads, spread on a special type of yellow paint, resulted in luminous line — one which has a golden glow under approaching headlights and was visible before the driver entered the no-passing zone. This reflectorized line is now a standard marking on all Indiana state highways which carry an average traffic of 750 or more vehicles daily.

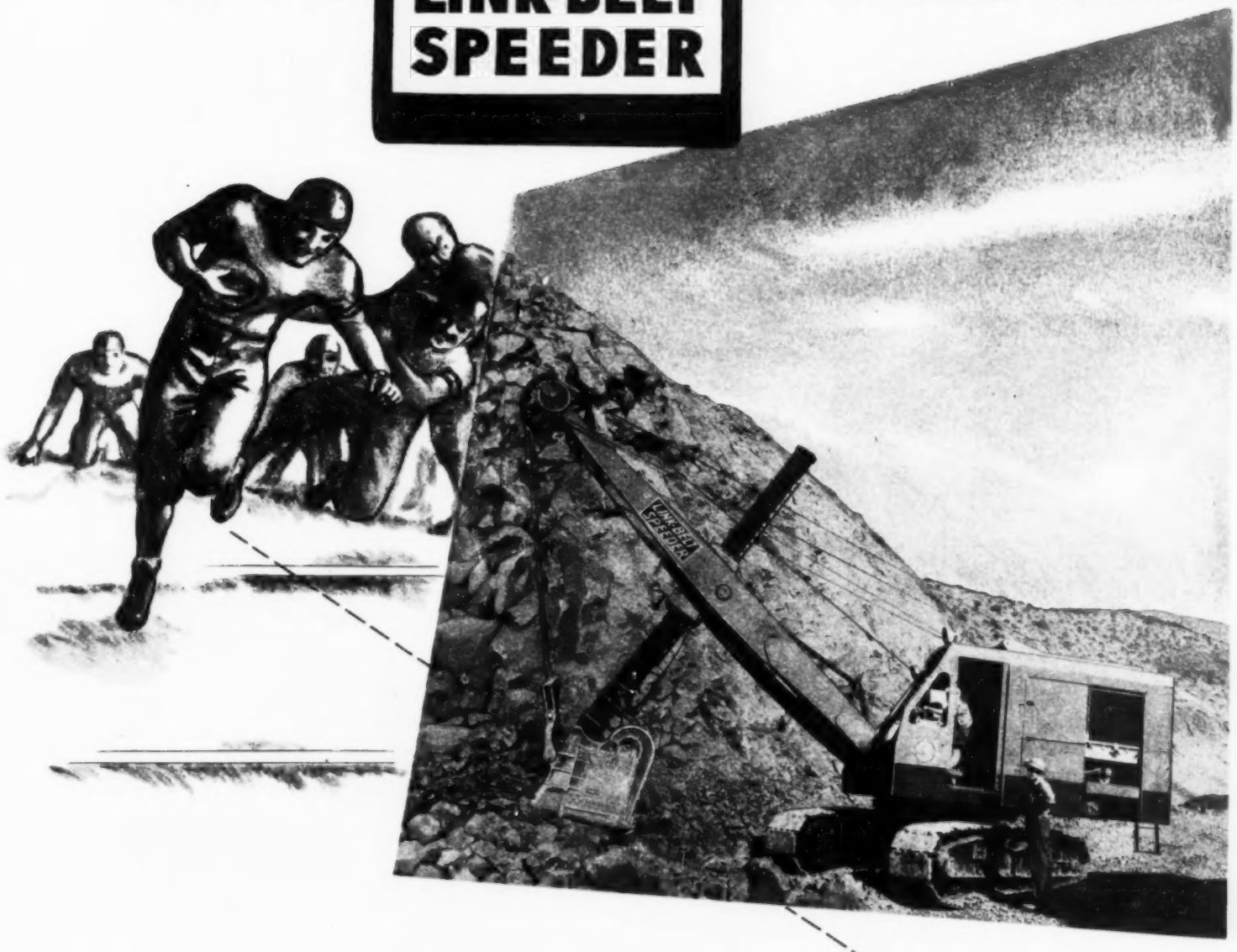
Application of this line is one of the operations connected with the mainte-

(Continued on page 85)



THROUGH TUBES fed by container on rear end of striping machine flow of glass beads is regulated by operator riding on rear platform of outfit.

KEEP YOUR **LINK-BELT SPEEDER** IN TOP-NOTCH CONDITION



MAINTAIN IT PROPERLY
To Get The Most Out Of It

Machines and athletes have one thing in common—they need plenty of care, no matter how tough they are. The rugged quarter-back of a football team can "take it" because his trainers watch over him and see to it that his "machinery" is in top-notch condition at all times. Machines are made of metal—and metal, like muscle, is subject to fatigue. With a reasonable amount of maintenance-care your rugged Link-Belt Speeder will provide years of efficient, dependable, trouble-free service. Maintain the machine properly—keep it painted to prevent rust; keep clutches and brakes in proper adjustment and their linings clean; keep the machine well lubricated and clean at all times. Always check all bolts and nuts for tightness while going over machine for greasing. Give your Link-Belt Speeder a reasonable amount of attention and you will obtain full capacity service —24 hours a day—without danger of a major breakdown.

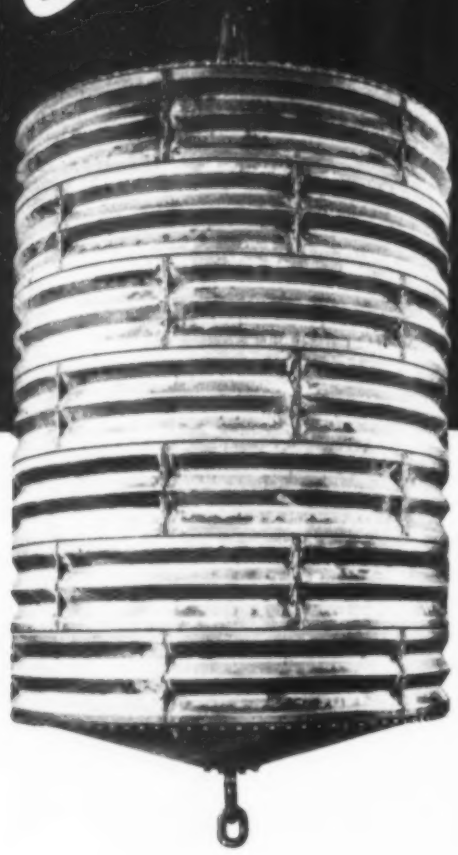
8993

LINK-BELT SPEEDER CORP.

Builders of the Most Complete Line of Shovels and Cranes

301 W. PERSHING RD., CHICAGO

METAL TUNNEL LINER
GETS IT'S
"SEA LEGS"



War is changing the shape of steel. Now it is tanks, planes and guns instead of peacetime products. Occasionally, as in this Navy buoy, you'll recognize an old familiar friend. It's a war-time, nautical version of ARMCO Tunnel Liner Plates.

Perhaps it will help remind you how much ARMCO Liner Plates will someday contribute to easier, safer tunneling. Gage for gage, ARMCO heavy duty liner is stronger (section modulus) than any other plate. On a strength/weight basis it costs less at the start. Work moves fast because one man handles the light sections and only structural wrenches are needed for assembly. Where completed rings can be spaced to take advantage of partly self-supporting ground, you may actually buy fewer plates.

Remember that after the war ARMCO Liner Plates will be back—better than ever before—to help you cut costs and speed tunnel work. Armco Drainage Products Assn., 1155 Curtis St., Middletown, O.

ARMCO

ARMCO

TUNNEL LINER PLATES

CONSTRUCTION EQUIPMENT NEWS

Review of Construction Machinery and Materials for DECEMBER, 1942

40-FT. TELESCOPIC PORTABLE ELEVATOR for use on maintenance and construction work not only raises materials for installation and lowers them for removal, but also provides generous platform footing. Capacity, 1,500 lb.; overall height, 40 ft. 4 in.; platform, 36 in. long by 72 in. wide. Hoisting unit, 3 hp., 110 v., dc. Lifting speed, approxi-

mately 30 ft. per min. Slack cable platform locking device. Photograph shows stacker mounted on large tractor. Push-button control at right of truck operator allows man riding in tractor to control raising and lowering of load. Generator, mounted on truck, supplies power. Stacker may be built with other capacities, lower collapsed height and various platform sizes. Can also be operated on its own wheels, base width being 7 to 8 ft. Uses: installation of sprinklers, wiring, lighting fixtures and for other general maintenance purposes. — **Lewis-Shepard Sales Corp., 245 Walnut St., Watertown, Mass.**

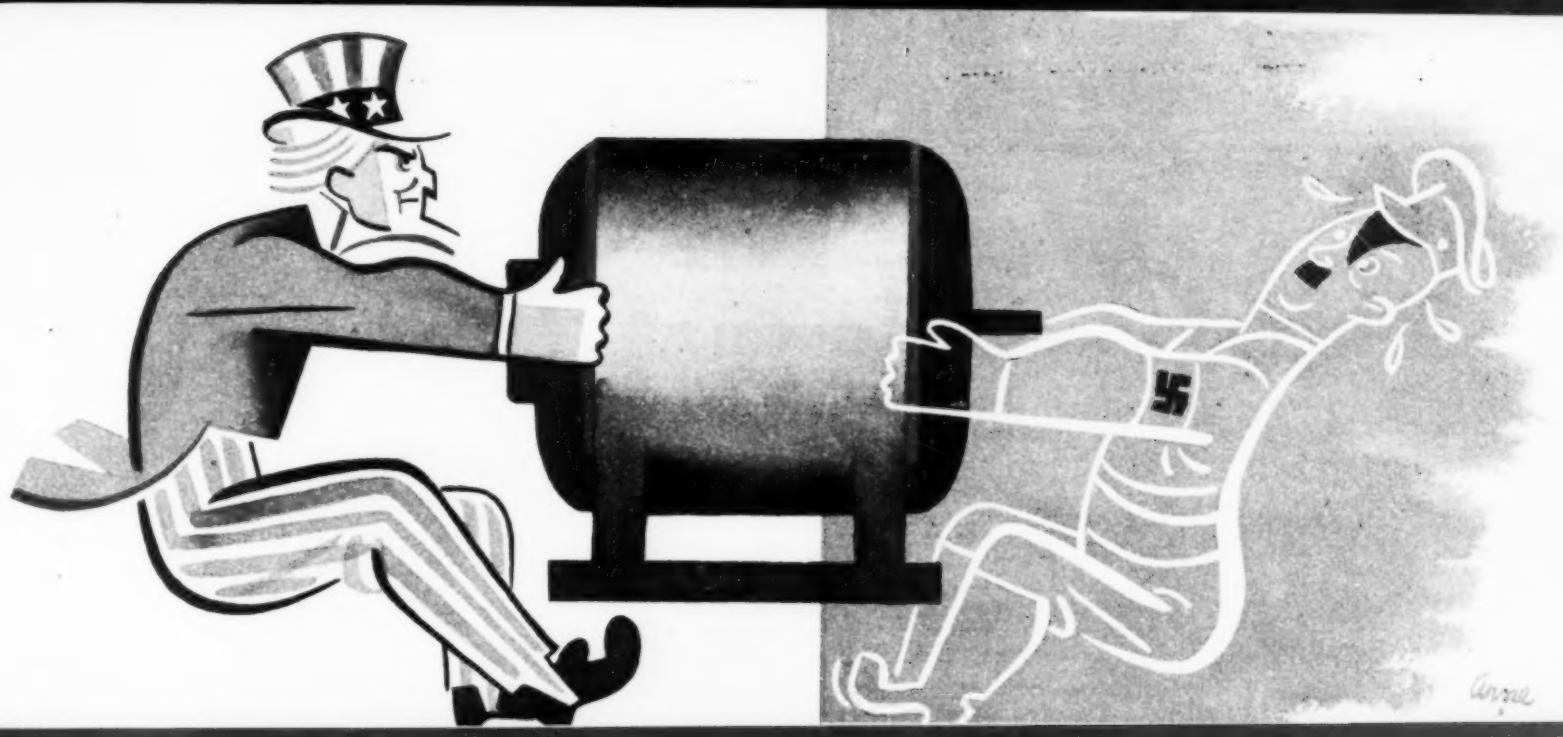
★ ★ ★

NEW TRANSPARENT PLASTIC called C.R. 39 is said to have many times abrasion resistance of other clear plastics and not to dissolve in acetone, benzene, toluene, alcohol, gasoline or any other common solvents. Resistance to abrasion said to be 10 to 30 times greater than other clear plastics. Claimed to retain shape even when exposed to high atmospheric temperatures and can be formed into large sheets, either clear or laminated, by application of extremely low pressures. In transparent sheets its strength, weight, clarity and impact resistance are said to be comparable with other transparent resins. In primary form, C.R. 39 is clear, low viscosity liquid, which, in presence of catalyst and heat, hardens into crystal clear solid. Layers of fabric, paper and like can be impregnated with liquid material and cured under low pressure to form sheets or shaped objects with minimum of expense for tooling. Ordinary plastics used in this way require pressures up to 50 lb. per sq.in. to many tons to produce suitable laminated material. Claimed to open up broad new field of plastic applications, but is not available for commercial use at present, because of priorities and other restrictions. — **Columbia Chemical Division, Pittsburgh Plate Glass Co., Grant Bldg., Pittsburgh, Pa.**

★ ★ ★

SAFETY CLOTHING for protection of welders against painful and dangerous exposure to molten metal sparks has been designed by expert welder of many years' experience and has been constructed, according to its manufacturers, to offer maximum protection, to fit comfortably and to give long, efficient wear. Made of chrome tanned cowhide weighing ap-

proximately 5 oz. per sq.ft. Fire resisting duck used for backing weighs 12 oz. per sq.yd. Fleece lining for gloves and mittens weighs 6 oz. per sq.yd. Wide use of Kip splits — whole hide of animal — has reduced number of seams in garments and enabled designers to locate them well away from line of fire. All seams double cotton stitched and reinforced with metal stitching. Coats and cape sleeves have flat



HOW MUCH OF YOUR MOTOR CAPACITY IS ON THE ENEMY'S SIDE?

APPLY THIS GUIDE

(based on recommendations of WPB)

TO DECIDE UPON MOTOR SIZE

1. For open-type a-c motors (continuous rated 40 C) where ambient temperatures are generally below 40 C, use motors rated as low as 80% of actual required horsepower. EXAMPLE: Where 9.3 is required horsepower—9.3 x .80 = 7.44; select a 7.5-hp motor.

2. For a-c or d-c motors rated on a 50 C or 55 C basis, where ambient temperatures are generally below 40 C, use motors rated as low as 91% of actual required horsepower.

3. For open-type d-c motors (continuous rated 40 C) where ambient temperatures are generally below 40 C, use motors rated as low as 87% of actual required horsepower.

4. In selecting motor types, base your choice on these conservation factors, wherever operating conditions permit:

Use standard open motors instead of "specials"—high-speed instead of low-speed—single-speed instead of multiple—single-winding rather than two-winding—a-c instead of d-c—squirrel-cage instead of slip-ring—440-volt motors instead of 220 (or use 2200 volts above 100 hp).

An up-to-the-minute guide on wartime motor selection is now included with each copy of the G-E MOTOR FITNESS MANUAL, a booklet prepared to help you get the most out of every motor you now have in service. For your copy, call or write your local G-E office.

MOTORS NEEDLESSLY LARGE FOR THE JOB—plus the oversize distribution circuits they require—may be 25 per cent or more on the side of the Axis! That's the percentage of copper and other scarce materials frequently wasted by overcautious motor specifications—by buying the "next larger size" than a machine actually needs.

The extra amount of critical material used in the oversize motor itself is only part of the loss. Operating a motor continuously below its rated capacity can mean wasted copper all the way back to the power plant. Thus, even your present motors should be so applied as to avoid "over motoring," wherever possible.

The WPB joins in urging you to modify your peacetime motor policy in the cause of conservation. By following its recommendations whenever you buy or install a motor, you'll be helping to make more metals available where they're most needed to win the war. *General Electric, Schenectady, N. Y.*

The Navy "E", for Excellence, has been awarded to 92,780 General Electric employees in six plants manufacturing naval equipment

BUILDER OF TRI-CLAD MOTORS

GENERAL ELECTRIC

730-173A-8030

An Extra Mile of Ceiling

On the fighting fronts are thousands of war planes whose engines are fired by dependable energy from American Bosch aviation magnetos — wizards of electrical efficiency supplying the *right* high-tension spark at the *right* split-second of time, thousands of times per minute, hour after hour.

That's no more than you'd expect of fine magnetos. But American Bosch has not rested on past performance. Other factors equal, the plane *on top* is the plane that wins the fight. So up go ceilings, and American Bosch engineering keeps pace.

Today American Bosch magnetos perform unfailingly *several thousand feet higher* than ever before required. As planes fly still higher, American Bosch magnetos will be ready for them — are ready today.

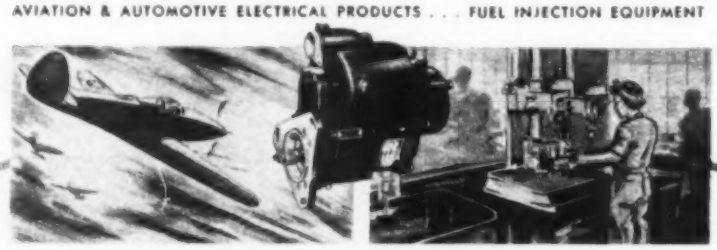
For American Bosch pioneering, engineering "know-how" and New England craftsmanship are on the production warpath, keeping faith with American aviation.

American Bosch Corporation • Springfield, Massachusetts

Craftsmen in the New England Tradition

AMERICAN BOSCH

AVIATION & AUTOMOTIVE ELECTRICAL PRODUCTS . . . FUEL INJECTION EQUIPMENT



seams to prevent irritation and excessive wear at elbows. Equipped with large durable snap fasteners, easy to open and close and said to stand up under hard service. Listed in this line of safety clothing are: overalls, all-leather pants, hot weather pants, chaps, split leg aprons, one-piece aprons, coats, cape sleeves and bibs, short jackets, welders sleeves, spats, gloves and mittens, sleevelets, and various complete protection combinations. — **American Optical Co., Southbridge, Mass.**

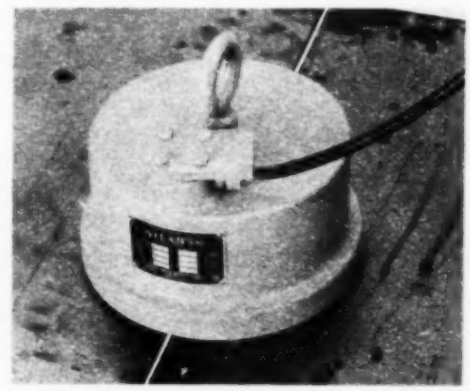
* * *

NEW TYPE HACK SAW FRAME has cam-action lever-lock which sets up and releases blade eliminating loose blade studs and threaded tension devices, permitting blades to be replaced or repositioned in fraction of time required with conventional design frames. Straighter cuts and reduced blade breakage result from extremely high tension which new heat-treated spring steel

frame puts on blade. Gun metal finish insures high resistance to rust and all other forms of corrosion. Handle, either straight or pistol grip, is made of rust-free, heat-resistant Tenite—a non-conductor of electricity. Frame may be adjusted for 8-, 10- or 12-in. blades by pulling out single pivot to its open position, sliding frame forearm in or out to desired length and snapping pin back into place. Blade may be re-positioned to face in any of four directions by placing it over either of two sets of fixed pins integral with frame. Frame cannot jack-knife or come apart accidentally with blade removed and there are no loose parts to fall off. Each frame is sold with one blade, and included in package is cardboard wall chart carrying instructions and hints on proper selection and use of blades and frames, including blade selection table. — **Victor Saw Works, Inc., Middletown, N. Y.**

* * *

MAGNETIC WELDING CLAMP for use in drawing and holding plates together to facilitate welding, is designed in various sizes, one shown in photograph measuring 10 in. in diameter and weighing approximately 70 lb., with pull of 2,000



lb. on ¾- and 1-in. steel plates and operable from 40 to 60 v., dc. In welding, when plates are drawn together, invariably one is higher than other. Holding magnet draws plates to level alignment with edges flush against perfect surface of magnet. By tacking welds to plates on either side of magnet, welder is able to maintain alignment during welding process.—**Stearns Magnetic Mfg. Co., Milwaukee, Wis.**

Timber MEETS EXACTING REQUIREMENTS

New Multnomah County (Ore.) all-timber bridge, designed by A. R. Fairbank, Bridge Engineer, and prefabricated and erected by Timber Structures, Inc., Portland. The TECO Connectored Span is 88 ft.; the bridge 132 ft. with a 24-ft. roadway.

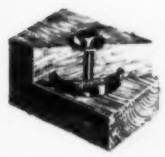
TECO System of construction shows way to Elegance, Economy, and Rigid Strength under city traffic.

Eye-appeal was an essential . . . the bridge had to be easy on the exchequer . . . and capable of sustaining an H-15 traffic loading *plus* forty tons of concrete pavement — *without deflection or vibration.*

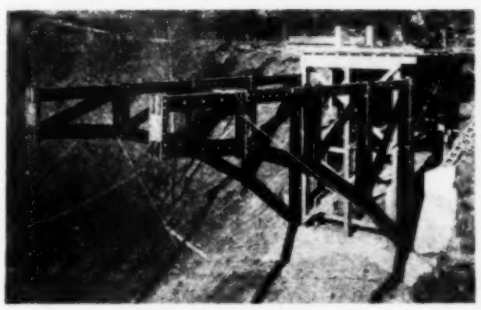
This bridge, now in service in Portland, Ore., amply fulfills these requirements.

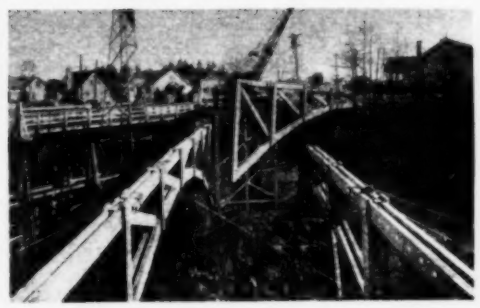
TECO Ring Connectors endowed the joints with great strength while reducing, at the same time, the size of the timber members. Prefabrication under the TECO System saved time, labor, and money. No falsework was needed to erect it. And, a single crane did the job.

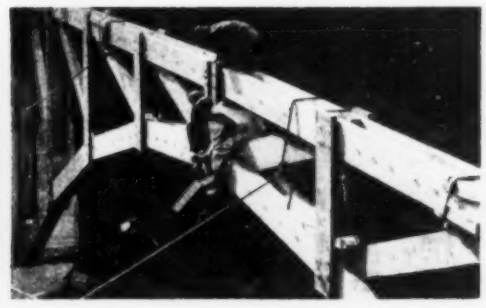
Write today for full details.



TECO Ring Connectors spread the load on a timber joint over practically the entire cross-section of the wood.







Timber ENGINEERING COMPANY

WASHINGTON, D. C. PORTLAND, OREGON

HAISS HI-POWER

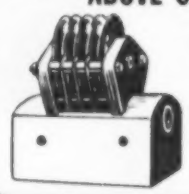
The Clamshell Bucket that has *Skyrocketed* to Popularity

FOR GENERAL EXCAVATION, TRENCHING, CAISSON WORK AND DREDGING

1 HIGHEST CLOSING RATIO (UP TO 7:1)

Can be reeved 3, 4, 5, 6 or 7:1 for speed or power as required. *Exclusive* 4-Position Wedge-Lock dead ending keeps reeving always parallel and 100% centered in sheave grooves.

2 LOWER SHEAVES HIGH ABOVE COUNTERWEIGHT



Up, out of the muck. Non-pocketed. No place for dirt to jam, to cause friction or undue rope wear. Bolt holes in block provide for added counterweight.

3 Super-rigid, web-braced, one-piece cast steel head frame.

Streamline-digging bowl contour.

The best steels the market affords in each and every part.

Designed and built to add still further to Haiss reputation for QUALITY.

4 HEAVIEST JAWS OF ANY BUCKET OF ITS KIND

Abrasion resistant alloy. Will stand heavy battering and still hold shape. Chisel-point or pick-point teeth of similar extra strength.

What it is that makes a Haiss Hi-Power such a bear-cat at digging is no one thing. It's weight distribution. It's flow-lined bowl contour. It's reeving with up to 8 parts of line. It's special pick-point teeth. It's a hefty rigidity that keeps jaws lined up. It's oversize hinge pins to resist wear. It's the best of steels to give long extra months of service. It's all that 50 years of bucket building has taught Haiss—and the plus value that Haiss has engineered into every bit of equipment that bears the Haiss name. Buckets in stock at New York, Philadelphia, Baltimore, Atlanta, Richmond, Charlotte and Los Angeles. . . . *Write or wire for prices, delivery and catalog details.*

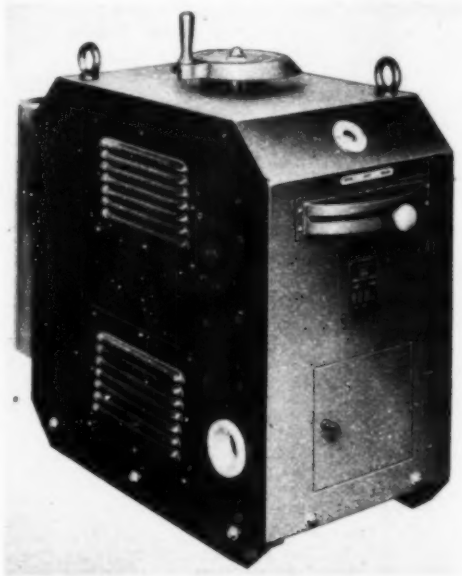
GEORGE HAISS MFG. CO., INC.
139th ST. & CANAL PL., NEW YORK

HAISS QUALITY EQUIPMENT FOR 50 YEARS 1892 ★ 1942

HAISS

PORTABLE CONVEYORS ★ LOADERS ★ CLAMSHELL BUCKETS

HEAVY-DUTY, MANUALLY OPERATED WELDER with range of 20 to 625 amp., said to be unusually wide range of heats in single machine, handles variety of jobs from light sheet metal to heavy production work. Operator may select desired heat from two ranges by manipulating specially designed switch. Low range provides heats from 20 to 200 amp., high range from 200 to 625 amp. Switch has three positions: off, high and



low. Transformer utilizes principle of flux diversion, maintaining stepless heat control throughout entire output range. Input is in direct proportion to output, thereby using all possible energy for productive work. Operator's safety is assured by (1) ample spacing of transformer primaries and secondaries on separate legs of core, preventing breakovers; (2) core design and absence of external reactors obviate welding surges; (3) power factor correction is standard equipment accomplished by oil-type capacitors, utilizing non-inflammable oil. Transformer core is made of laminated die-stamped plates of special low-loss transformer steel bolted in place and supported by heavy steel frame, thus eliminating noise and tendency to shift under load.—**Glenn-Roberts Co., 1009 Fruitvale Ave., Oakland, Calif.**

★ ★ ★

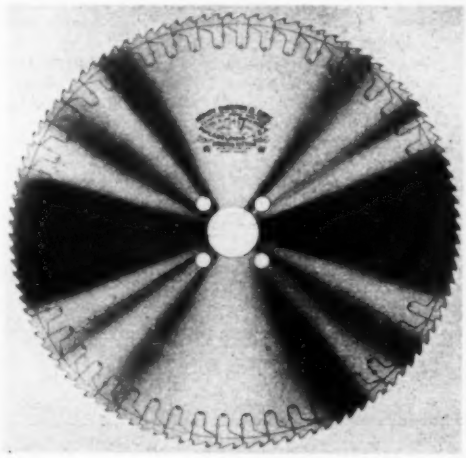
WEATHERPROOFING PREFABRICATED METALS is now being accomplished by use of "Plastipitch," a pitch of improved plastic characteristics, replacing galvanizing and rolled bituminous applications for weatherproofing and protecting metals against corrosive atmospheric conditions. Used in simple bonding process to weatherproof all types of metals of various sizes, shapes, forms and gages. In this process only prefabricated or preformed metals are used. No further shaping or forming is required after Plastipitch application is completed, thus avoiding possible rupture of coating bond and strains on metal which may result from further mechanical processing. Outstanding characteristic: ability to provide special climatic or weather resistant qualities as may

be required to meet arctic or subtropic conditions. This is accomplished by modifying Plastipitch before application to metal to produce coating that will not become brittle or chip off at low temperatures or melt and flow at high atmospheric temperatures. Available in various types of finishes and in variety of colors, fineness and quality of mineral surfaces.—**Coated Products Corp., P.O. Box L., Verona, Pa.**

FIGURING PAY ROLLS AND JOB COSTS said to be accomplished easily and in fraction of usual time by using calculator which operates on simple principle. Device includes all hourly rates of pay from $0.50 to $1.75 with ½c. spread between rates. Covers all time periods up to 104 hr. with divisions of 1/10 of an hour. Made of lacquered wood and fits into desk drawer.—**Berger-Bricker Co., 433 S. Spring St., Los Angeles, Calif.**

★ ★ ★

"INSERTED SECTION SAW" combining advantages of both inserted and solid tooth type circular metal cutting saws, is continuous rim unit with inserted sections rather than inserted teeth. Provides maximum number of teeth for any given diameter and cuts smoothly. Operates at speeds up to 5,000 ft. per min. Permits thinner blade and cutting edge than is customary with saws having individual inserted teeth and therefore cuts a narrower kerf and in turn requires less power for driving. Cutting load is transmitted from each insert directly to blade approximately at right angles to resultant force and not to adjacent inserts or to rivets. Full

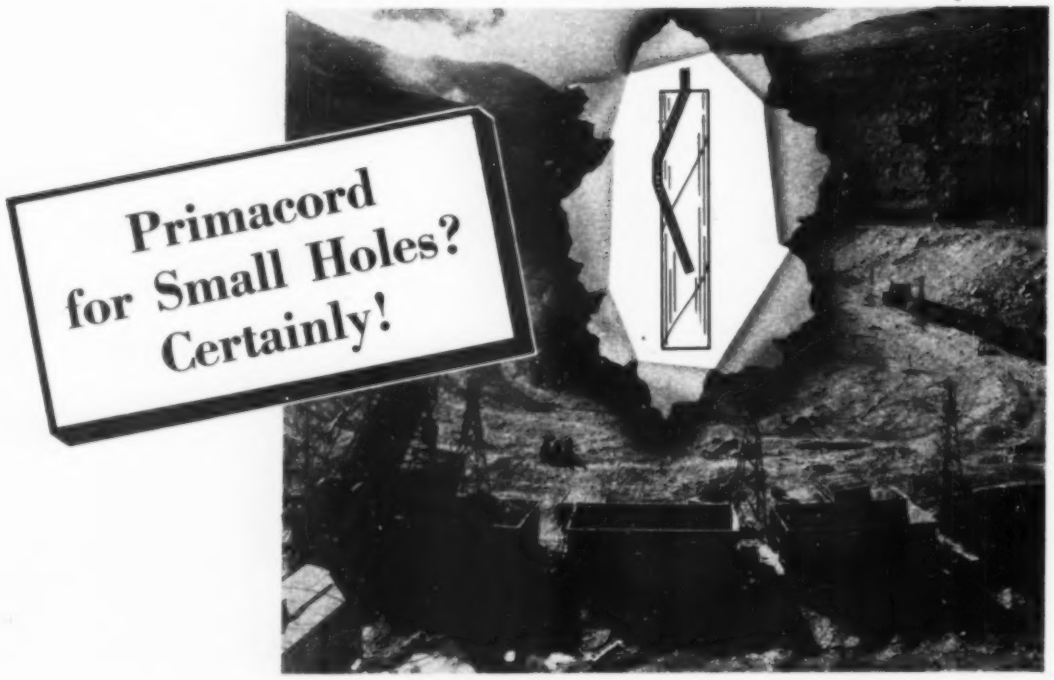


thickness of blade extends to extreme diameter, thereby giving maximum support to inserts, but assuring long life without cutting into projections when sharpening. Inserts quickly and easily replaced if damaged. It is not necessary to return saw to factory for refitting; work may be done in user's factory or in nearby repair shop.—**Henry Disston & Sons, Inc., Philadelphia, Pa.**

★ ★ ★

BLAND SKIN-PROTECTIVE CREAM, called Man-O, for active hands which serves as a guard against skin irritants, has recently been produced. The product is said to be easily applied. When rubbed into the hand, the portion of the arm exposed, around the finger joints, and under the nails before the worker starts his shift, Man-O forms an invisible and flexible glove-like film protecting the skin from absorbent grease, cutting oils, paint, gasoline and other substances difficult to clean off. The manufacturer claims that Man-O can also be used effectively as a guard against occupational skin irritations. It washes off easily with soap and water, taking all dirt with it. It can be obtained in 12-oz. cans, sufficient for about one hundred applications, and is also available in bulk.—**Saborn Products Co., 5511 Euclid Ave., Cleveland, Ohio.**

Best Fed Fighters IN THE WORLD
To keep our fighters "the best fed", our armed forces use the most modern mechanized kitchen equipment available. Here again Briggs & Stratton Motors are proving their value by furnishing dependable power for bread mixers, refrigerators, water supply, lighting plants and other gasoline-powered equipment.
Today, the entire facilities of the Briggs & Stratton Corp., are devoted to the war effort and approved civilian uses. Therefore, Briggs & Stratton, 4-cycle air-cooled motors, now in essential service, should be given every care to assure uninterrupted performance.
Most important in maintenance is the use of clean fuel, correct lubrication with the right grade of oil, changed at recommended intervals, and motor kept clean and properly adjusted. In any case of emergency, your dealer or nearest Briggs & Stratton Service Station will be glad to be of assistance.
BRIGGS & STRATTON CORP.
MILWAUKEE, WISCONSIN, U. S. A.
ARMY NAVY
4 CYCLE
BRIGGS & STRATTON
GASOLINE MOTORS



A series of small holes can be detonated economically by the use of Primacord. The "primer cartridge" for each hole is usually prepared by punching the cartridge as shown above. The length of Primacord is then laced through these punched holes.

Each bore hole is loaded and tamped as usual, but the Primacord (extending out of the holes) is connected to a trunk line of Primacord, and the entire blast detonated with a single fuse and cap or electric blasting cap attached at one end of this trunk line.

The light weight and flexibility of Primacord-Bickford Detonating Fuse promote ease of use, and —with its high efficiency—produce desirable economies in blasting. Send for the Primacord Book.

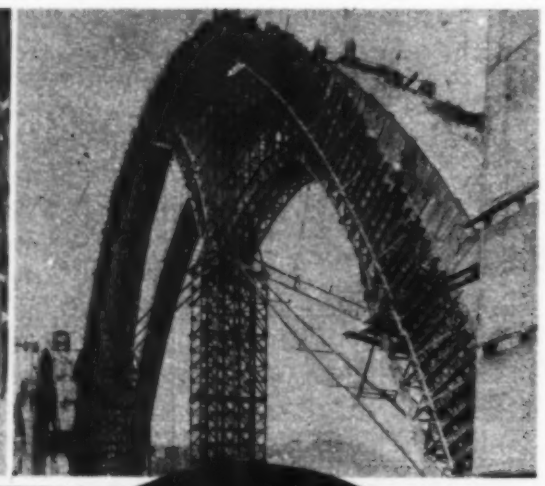
THE ENSIGN-BICKFORD COMPANY

SIMSBURY, CONNECTICUT

Manufacturers of Safety Fuse since 1836

PB-50

PRIMACORD-BICKFORD DETONATING FUSE



for Speed in Construction

The rapid progress of engineering construction has naturally influenced the design of Blaw-Knox Steel Forms with respect to their general application and operation.

The engineering facilities and services extended by Blaw-Knox form engineers are prized by all who have taken advantage of them. These services are offered in the interest of engineering progress and are free from any charge or obligation.

BLAW-KNOX STEEL FORMS

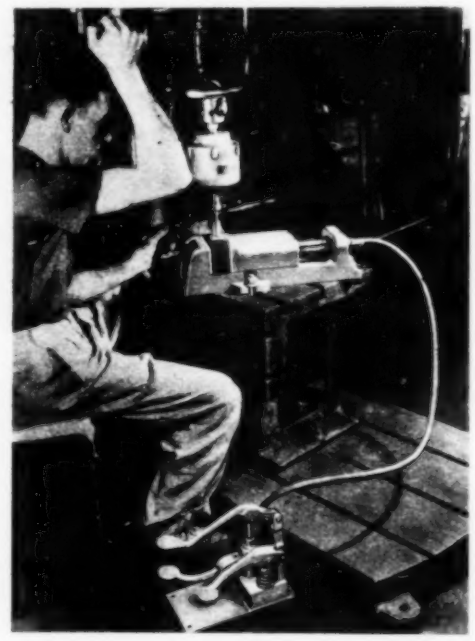
BLAW-KNOX DIVISION
of Blaw-Knox Company
Farmer's Bank Bldg. Pittsburgh, Pa.
New York Chicago Philadelphia Birmingham

COMBINATION BULLDOZER-SHOVEL made to fit all makes and models of tractors, having heaped capacity ranges of from 1 to 4 cu.yd., and lifting capacities from 3,000 to 12,000 lb., is versatile construction unit capable of performing many scraping, bulldozing, excavating and land-clearing operations. Hydraulically controlled from driver's seat, it digs, carries or floats material,

dumps it, cuts smoothly and spreads evenly. Depth of cut is regulated by raising and lowering of clam. Either end of Bull clam may be tilted independently to 24-in. angle from driver's seat while tractor is in motion. Loads may be carried as high as 3 ft. above ground. Drop below ground level is 1 ft. In addition to cut-and-fill work, machine removes and transports trees and stumps; hauls boulders, snow or ice; tamps fills, opens drains, lays pipe, tile or cable lines. By keeping clam wide open, outfit may be used as bulldozer without obstructing view of operator.—**Hi-Way Service Corp., 3841 W. Wisconsin Avenue, Milwaukee, Wis.**

★ ★ ★

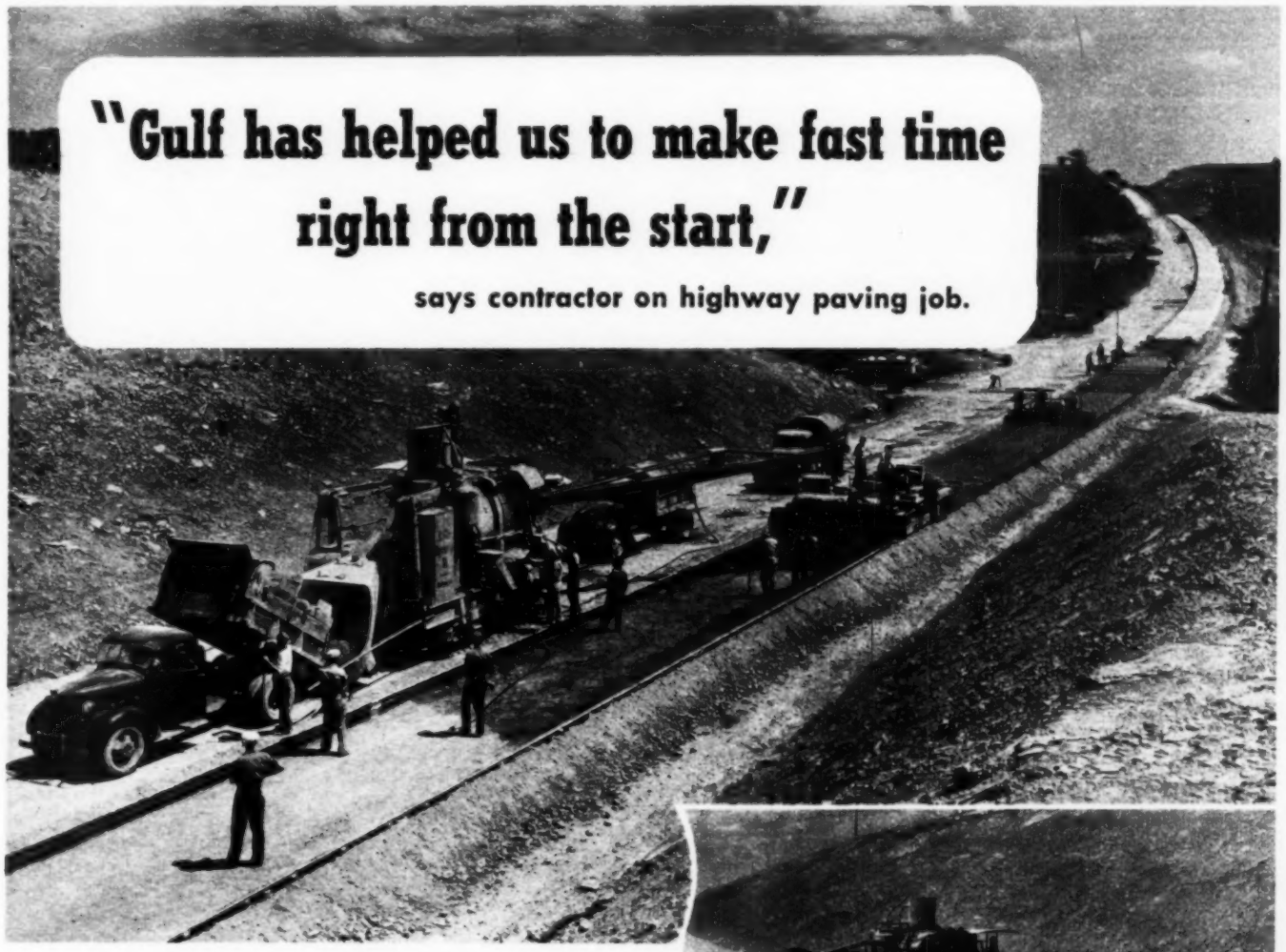
AUTOMATIC DRILL VISE, called "Drilvise," for use by tool and die makers, machinists and machine operators, is hydraulic, self-contained unit entirely foot-controlled, leaving operator's hands free for set-up and removal of work from machine. Requires no outside air or power supply. Consisting of drill press vise with hydraulic foot-control base connected to it by 6-ft. length of flexible rubber tubing. To operate, rear jaw is moved toward stationary front jaw to contact

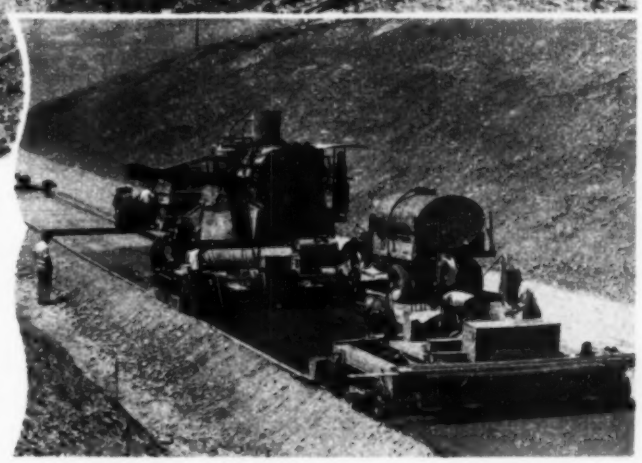


grip of work by depressing with one stroke middle foot-control pedal. Holding power is obtained by "pumping" right or "booster" pedal which moves jaw forward maximum of 3/16 in. each time pedal is depressed and exerts maximum non-slipping pressure of 10,000 lb. per sq. in. To release work, left pedal is depressed. Has ample grip for tools, jigs and dies. Advantages: (1) Safety—operator need not touch mechanism with his hands; sudden pressure clashes or release of jaws cannot occur; (2) adaptable and portable—for use in aviation, in machine tool field and for many other applications; (3) tightening and releasing operations that formerly took from 1 to 2 min. are completed in 5 and 10 sec.—**Studebaker Machine Co., 9 S. Clinton St., Chicago, Ill.**

"Gulf has helped us to make fast time right from the start,"

says contractor on highway paving job.





"No mechanical delays,
and better all-round performance
of our equipment
with Gulf lubricants and fuels
are two important reasons why we're
well ahead of schedule"

The Hussey and Holderman Construction Company, Columbus, Ohio, associated with the Ralph Myers Construction Company, Salem, Indiana, is paving a ten-mile section of Route 8 north of Butler, Pennsylvania. Paving is nine inches of concrete. Operating a large number of units of modern paving equipment and with Gulf lubricants and fuels in service, the subcontractor is considerably ahead of schedule on this $1,130,000 job.

GULF

"RIGHT from the start of this job we steered clear of mechanical troubles and obtained better all-round performance from our equipment by using Gulf lubricants and fuels," says the contractor on this highway paving project. "And these are two important reasons why we're well ahead of contract schedule."

The rate of progress and the profit on any engineering or construction job depend to a large extent on the efficiency of the equipment that does the work. That is why many leading contractors standardize on Gulf lubricants and fuels—they know that with these quality Gulf products they can always rely on better performance and extra hours of trouble-free service from every unit of equipment.

You, too, will find it pays to call in a Gulf engineer to prescribe the right Gulf lubricants and motor fuels for *your* equipment. His services are quickly available to you through more than 1200 warehouses located in 30 states from Maine to New Mexico. Write or 'phone your nearest Gulf office today.

GULF OIL CORPORATION
GULF REFINING COMPANY
GULF BUILDING · PITTSBURGH, PA.

TARPAULINS

Shipped Immediately

NO PRIORITIES NECESSARY*

Now you can phone any of the Distributors listed at the right —order any of the tarpaulins in sizes and brands listed below— and, unless there has been an unusual demand for the particular item you specify—YOUR ORDER WILL BE SHIPPED IMMEDIATELY...

*This fortunate condition is due to the fact that a large stock of tarpaulins has been made up from released goods and is awaiting your call.

BEAVER BRAND EXTRA

7.50 OZ. BEFORE WATERPROOFING
16 OZ. AFTER WATERPROOFING

STOCK SIZES

6 x 8	12 x 14
8 x 10	15 x 20
10 x 12	20 x 20

DEERSKIN BRAND EXTRA

10 OZ. BEFORE WATERPROOFING
18 OZ. AFTER WATERPROOFING

STOCK SIZES

8 x 10	12 x 14
10 x 12	12 x 18
10 x 14	15 x 20
10 x 16	20 x 20

MULEHIDE BRAND EXTRA

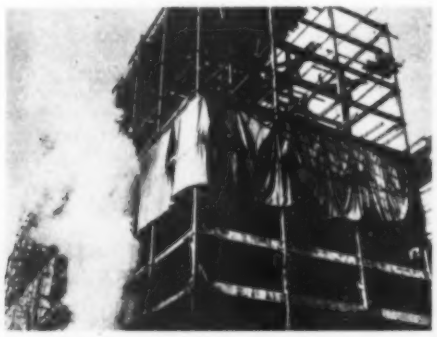
12 OZ. BEFORE WATERPROOFING
20 OZ. AFTER WATERPROOFING

STOCK SIZES

12 x 16	
14 x 16	18 x 24
15 x 20	20 x 20

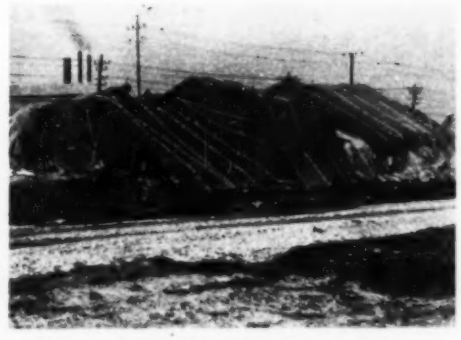
ALL THE ABOVE BRANDS TREATED WITH GENUINE PARA WATERPROOFING

NATIONALLY STOCKED FOR IMMEDIATE SHIPMENT



For floor-by-floor protection on jobs like this, tarpaulins keep cold out, heat in.

For over-all protection, tarpaulins may be suspended from temporary framework.



Keep vital construction materials well protected. Avoid loss and costly delays.

YOUR GUARANTEE GENUINE PARA PURE PARAFFIN BASE WATERPROOF TREATMENT

H. WENZEL TENT & DUCK

ST. LOUIS, MO.

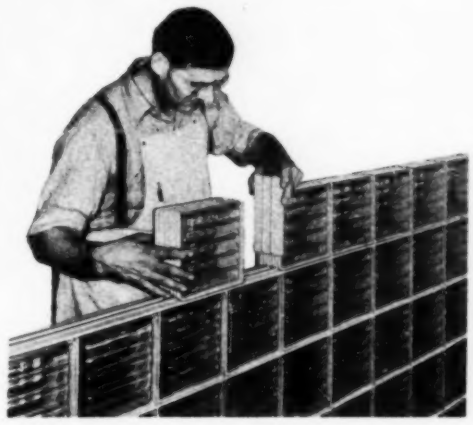
YOUR GUARANTEE
GENUINE
PARA
PURE PARAFFIN BASE
WATERPROOF TREATMENT

Phone Your Orders to Your Nearest
DISTRIBUTOR

ALABAMA
Owen-Richards Co., Birmingham
ARIZONA
O. S. Stapley Co., Phoenix
CALIFORNIA
Industrial Equipment Co., Oakland
CONNECTICUT
Gesner Equipment Corp., Hamden
DISTRICT OF COLUMBIA
Hudson Supply & Equipment Co., Washington, D. C.
ILLINOIS
Becker Equipment & Supply Co., Chicago
Joseph Bahr & Sons, Rockford
Clark & Barlow Hardware Co., Chicago
INDIANA
Standard Equipment & Supply Co., Hammond
Van Camp Hardware & Iron Co., Indianapolis
IOWA
Harry Alter & Sons, Davenport
Pecaut Industrial Supply Co., Sioux City
LOUISIANA
C. T. Patterson Co., Inc., New Orleans
MARYLAND
General Supply & Equipment Co., Baltimore
MASSACHUSETTS
Hodge & Matthais Co., Boston
Parker-Danner Co., Boston
MICHIGAN
Eddy & Cuthbert, Lansing
C. L. Gronsden & Co., Detroit
MINNESOTA
Equipment Rental & Sales Corp., Minneapolis
Thorman W. Rosholt Co., Minneapolis
MISSISSIPPI
Contractors Material Co., Jackson
MISSOURI
Brown-Strauss Corp., Kansas City
Machinery & Supplies Co., Kansas City
The Victor L. Phillips Co., Kansas City
NEBRASKA
Anderson Equipment Co., Omaha
NEW JERSEY
Dale & Rankin, Inc., Newark
NEW MEXICO
Chas. Ilfeld Co., Albuquerque
NEW YORK
Keystone Builders Supply Co., Rochester
New & Used Equipment Co., Long Island
Syracuse Lumber Co., Syracuse
Trevor Corp., Buffalo
J. H. Welch Company, Inc., Buffalo
R. B. Wing & Son Corp., Albany
NORTH CAROLINA
Constructors Supply Company, Inc., Durham
Contractors Service Co., Charlotte
OHIO
Beck Supply Co., Columbus
Construction Equipment Corp., Cincinnati
Moriarty Machinery Co., Toledo
The W. T. Walsh Equipment Co., Cleveland
OKLAHOMA
The Victor L. Phillips Co., Oklahoma City
Mideke Supply Co., Oklahoma City
OREGON
Woodbury & Company, Portland
PENNSYLVANIA
Austin Supply Co., Philadelphia
Drava-Doyle Co., Pittsburgh
Howard W. Read Corp., Philadelphia
VIRGINIA
Noland Company, Inc., Newport News
Benj. T. Crump Co., Inc., Richmond
WEST VIRGINIA
West Virginia Tractor Equipment Co., Charleston
WISCONSIN
Hunter Tractor & Machinery Co., Milwaukee

CO.
YOUR GUARANTEE GENUINE PARA PURE PARAFFIN BASE WATERPROOF TREATMENT

GLASS-BLOCK PARTITIONS, consisting of Insulux glass blocks held in place by prefabricated wood separating strips, are now available for use in constructing any size wall, extending from floor to ceiling or waist or head high. New wall need not be of all glass block construction but may be combined with existing solid or frame partitions, wainscoting or dropped ceilings. After



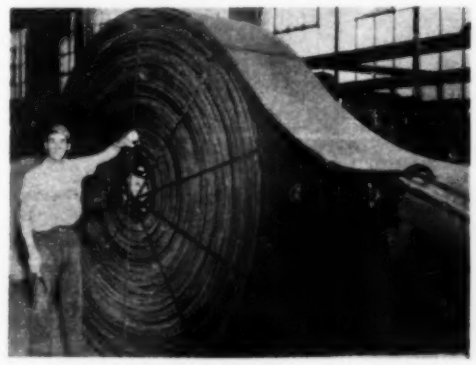
framing opening, glass blocks in panel are interlocked by horizontal and vertical separating strips and by wood wedges which hold sides and top of partition firmly in position. Average workman can erect partition after short preliminary study of detail sheets accompanying package of strips and wedges. Uses: partitions in homes, subdivision of office space, backs in shop windows; counter bases; wind screens adjoining exterior doors in shops and homes; inclosing walls around house stairways and halls. Advantages: minimum loss of daylight because of high light transmissibility of glass blocks; complete salvageability permits moving and relocating of partitions at any time; prepainting wood strips before erection allows creation of unusual color effects—**Insulux Division, Owens-Illinois Glass Co., Toledo, Ohio.**

★ ★ ★

ALL-POSITION WELDING ELECTRODE for use with mild steel and with a. c.-type welding machines is available in 1/16-, 3/32-, ⅛- and 5/32-in. diameters. Physical test results made on all-weld-metal tensile specimens are: Ultimate tensile strength, as welded, 70,000-75,000; stress relieved 65,000-70,000. Percent elongation in 2 in. as welded 25-30 percent; stress relieved 30-35 percent. An outstanding characteristic: average operators have no difficulty in obtaining good fusion and complete penetration. Finished weld deposit is said to be smooth and to have uniform surface contour. **Wilson Welder & Metals Div., Air Reduction Sales Co., 60 E. 42nd St., New York City.**

★ ★ ★

STEEL CARCASS CONVEYOR BELT with reinforcing of steel cables instead of customary cords or fabric is used by Oliver Iron Mining Co., of Duluth, Minn., to lift ore 240 ft. in an 1,100-ft. conveyor, obviating one, two or three transfers from individual belts which would have been necessary with old type conventional cotton fabric or cotton cord construction. Carcass of steel-



cable belt consists of parallel steel cables, each containing multiplicity of closely laid thin strands. It looks no different from other conveyor belts as rubber surface on each face and at edges is applied in identical manner. Although no thicker than conveyor belt with, for example, six plies of fabric, new belt's strength is actually equivalent of fourteen such plies. Steel cables on conveyor belts, according to manufacturer's claims, permit maximum of troughing, that is, deeper depression in center of belt to carry heavier loads without spilling over sides. In Oliver mine belt there are 1,341,000 ft. of cables or, in terms of miles, 253 mi.—**Goodyear Tire & Rubber Co., Akron, Ohio.**

★ ★ ★

FOR SEALING ASPHALT OR BITUMINOUS COATINGS which are used for waterproofing and which, in many cases, will not permit application of light colored coatings without asphalt's bleeding through, Carbo Seal Coat has been developed. This product, a substitute for aluminum, is said to seal these coatings, preventing bleeding. After seal coat has been permitted to dry for two or three days, finish coat should be applied by brushing lightly or by spraying in order to disturb seal as little as possible. If any abrasion to seal occurs before it is thoroughly dry, asphalt will bleed through any additional coatings. Use of Carbo Seal coat involves no fire hazard as this emulsion is thinned by water and consequently may be sprayed on roofs or hot areas adjacent to blast furnaces and similar units without danger—**Carbozite Corp., First National Bank Bldg., Pittsburgh, Pa.**

★ ★ ★

IMPROVED LEVEL TRANSIT is equipped with ball bearing race which insures perfect adjustment under unusual conditions and is said not to drag or tighten in sub-zero temperatures. Equipped with high power telescope and with

clamp and tangent screw to both horizontal and vertical circle. Designed especially for heavy-duty work in connection with all survey and checkup operations on building and road construction.—**David White Co., 315 W. Court St., Milwaukee, Wis.**

★ ★ ★

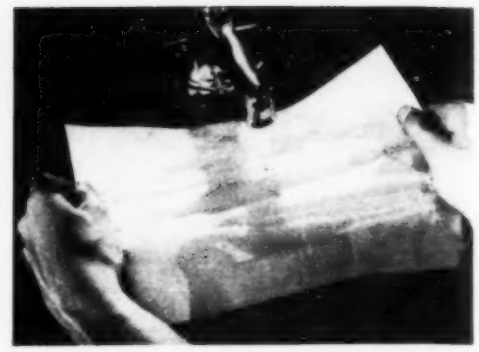
SUBSTITUTE FOR CLOTH AND BURLAP is new Aqualized paper, name having been suggested by paper's unusual strength when wet, feature not found in ordinary papers which tend to lose strength and to disintegrate in contact with water. This paper is said to have individual cellulose fibers effectively interlocked, providing an inherent wet strength all way through sheet that is independent of any coating or sizing on surface. Some types said to be highly absorbent;

DEPENDABLE

IT'S the more-for-your-money value built right into Blackhawk Hydraulic Jacks that makes them so downright dependable. They're rugged, tough, powerful; handle all jobs as they come — fast, smoothly, safely. That's why you need dependable Blackhawk Hydraulic Jacks to lick many tough wartime emergency problems of lifting, lowering, pushing, bending, testing, as well as everyday production, construction and maintenance jobs. Write for literature or see your Blackhawk Distributor.

***A Product of* BLACKHAWK MFG. CO.**
Department J23122 MILWAUKEE, WIS.

This seal is found ONLY on Blackhawk Jacks — your assurance of a wise and safe investment.



others to repel water. Possible uses: Clothing, pup tents, sandbags and camouflage, and food containers.—**Brown Co., 500 Fifth Ave., New York City.**

★ ★ ★

ANTI-FOG LENS PENCIL for use in keeping safety goggle lenses from fogging is claimed to secure satisfactory results for longer period of time than former types and to add to efficiency

of men working in steamy surroundings. In addition, pencil itself lasts longer without crystallizing or crumbling. — **American Optical Co., Southbridge, Mass.**

★ ★ ★

BAR RACKS made from inverted all-steel skid platforms are said to be ideal units for movement and storage of long bars or odd shaped parts. Platforms converted to this use are turned

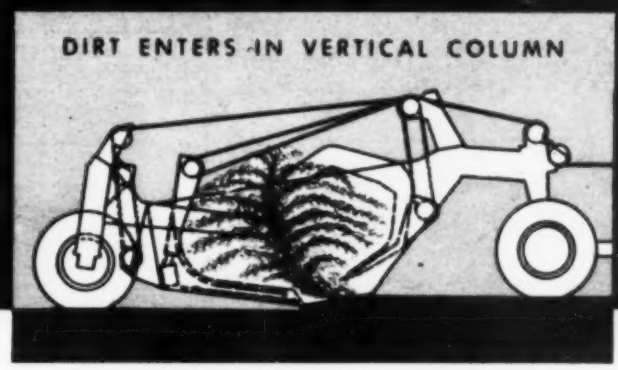
upside down and equipped with eyed brackets for insertion of crane hooks.—**The Union Metal Manufacturing Co., Canton, Ohio.**

THE DIRT "BOILS"

FOR FAST LOADING

Bucyrus-Erie

4 WHEEL SCRAPERS



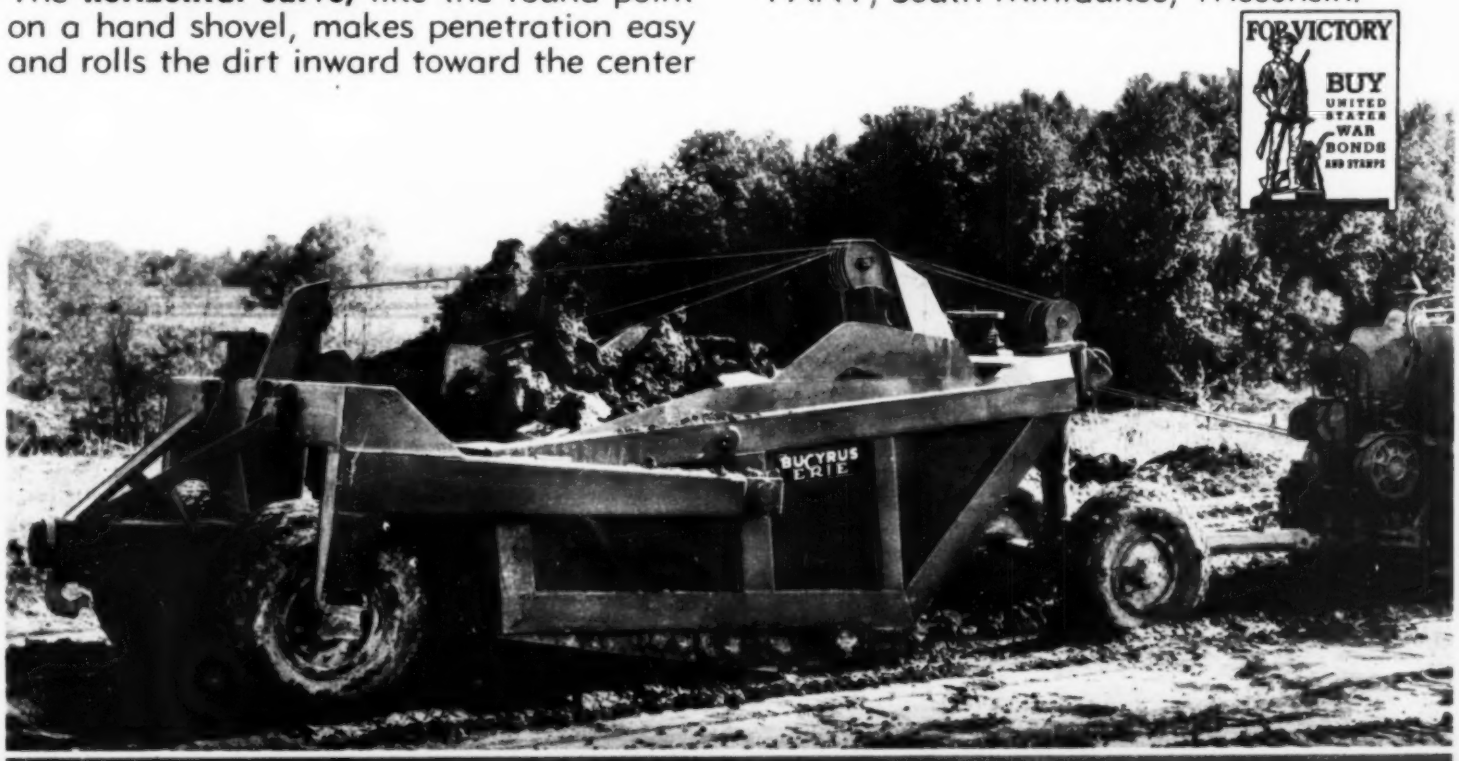
This diagram of the "boiling" action shows how the dirt flows evenly into both apron and bowl by the shortest possible route.

Bucyrus-Erie Scrapers load fast and in short distances because the cutting edge is double-curved (curved both vertically and horizontally) to "boil" the dirt up easily into both apron and bowl.

The **vertical curve** "curves" the dirt upward, just as the moldboard on a plow does. The dirt, entering in a vertical column, rises up through the load until it rolls out on top. Thus, you get maximum effectiveness from tractor power, because the last dirt entering the scraper doesn't have to push and pack the whole load in order to get in.

The **horizontal curve,** like the round point on a hand shovel, makes penetration easy and rolls the dirt inward toward the center of the bowl. This "rolling inward" action provides easy loading by reducing sidewall friction.

This two-way rolling action breaks up the dirt as it enters the bowl so that the scraper fills evenly with minimum voids, to give heaping payloads every time. The broken up dirt also rolls out easily for fast, free-flowing ejection. — BUCYRUS-ERIE COMPANY, South Milwaukee, Wisconsin.



BUCYRUS ERIE TRACTOR EQUIPMENT

SEE YOUR INTERNATIONAL TRACTRACTOR DISTRIBUTOR

CONCRETE PIERS

Faster Cheaper

with **Sonotube**

PAT. APP. FOR

The new laminated fibre concrete pier form

5 STANDARD SIZES

9	10	11¼	12	13⅓	Inside Diam.
64	78.54	100.	113.1	144	Sq. Inches

Immediate Delivery

Approved for Cantonments and other Government Construction — U. S. Army Engineers, U. S. Navy Department Yards and Docks, P. B. A. and F. H. A.

CUT

Sonotubes arrive on job up to 24' long—light, easy to handle—placed in cradle and cut with hand saw to proper lengths. (Laminated fibre easy to cut).

SET

Placed in position and aligned on footings. Minimum bracing for tall piers (up to 10 ft.) Backfilling sufficient for short piers.

POURED

Sill braces set, and troweled off—piers are soon ready for sills. No stripping is necessary. Wax treated forms will slough off eventually.

Write for Delivered Prices

SONOCO PRODUCTS COMPANY

HARTSVILLE, S. C. MYSTIC, CONN.

ROCKINGHAM, N. C. GARWOOD, N. J. LOWELL, MASS.

NEWS FROM MANUFACTURERS *About Their Products*

The publications reviewed below, will keep you posted on latest developments in construction equipment and materials available for your use.

LOW VISIBILITY PAINT—**The Arco Co.,** Cleveland, Ohio. (16 pp., two colors, illustrated). New type of paint possessing exceptional heat deflecting qualities is offered under name of "Infray" for use in protective concealment of vital defense structures and equipment. Meets tentative Navy specifications for infra-red reflecting paints for use on fuel storage tanks, buildings, and certain types of equipment where dark colors as well as heat reflecting qualities are required. Available in green, tan, black and four intermediate shades for camouflage purposes.

★ ★ ★

RUST PREVENTIVE PAINTS—**Rush-Oleum Paint Corp.,** 2425 Oakton St., Evanston, Ill. (20 pp., illustrated). Contains directions for proper application of rust preventive coatings, color chips illustrating variety of products available, and explanations of where and how these materials may be used to insure maximum protection. Catalog includes descriptions of special coatings designed to inhibit corrosive action of fumes, humidity and brine and special applications to be used where wide variation in temperature requires unusual elasticity. Brief descriptions of industrial wall and floor enamels for inside and outside use, house paints, asphalt paints and sealers.

★ ★ ★

PREHEATING INFORMATION FOR WELDERS—**Tempil Corporation,** New York, N. Y. (Wall chart, 18x23 in.) Formerly this chart has been distributed only to users of Tempilo products. Now the company has decided to send a copy to any reputable firm making a request. The information contained on it was gathered by technically competent men and represents years of intensive search through metallurgical bibliographies, as well as much material that is original with the company.

★ ★ ★

HOW TO FINISH WOOD FLOORING—**O'Brien Varnish Co.,** South Bend, Ind. (16 pp.) Any building contractor who has to finish an installation of floors—whether of oak, maple, pine, edge-grain fir, masonite, linoleum, cork, magnesite, cement or concrete—can learn a great deal by a close study of this booklet. The entire process of filling, varnishing and waxing is described. Precautions that must be taken under certain adverse condition are listed, and the best ways of maintaining finished surfaces are described.

★ ★ ★

BETTER BALL BEARING LUBRICATION—**S.K.F. Industries, Inc.,** Philadelphia, Pa. (28 pp. illustrated.) A treatment of the entire problem of how best to take care of your anti-friction bearings. The booklet is based upon the findings of the Annual Bearing Engineers' Committee, which has drawn up specifications and directions for the care of all standard types of annular anti-friction bearings. Several charts are displayed as guides to owners in taking proper care of their rotating equipment.

FASTER, SURER PRIMING *SPEEDS UP WORK!*

On the job performance proves that DOUBLE PRIMING, exclusive with CMC speeds priming as much as six times. Yes, any CMC delivers full capacity far quicker than single priming pumps. Renewable Impellers and wear plates add years to their life. Sizes 1½" to 10" . . . a complete line.

New Special CMC Pump Catalog Now Ready. Write for your copy!

CONSTRUCTION MACHINERY CO.

WATERLOO, IOWA

MIXERS • PUMPS • HOISTS
BATCHING & PLACING EQUIP.
SAWS • CARTS • BARROWS

War Has Made "Doing It the Hard Way" Out-of-Date!

For example, where it formerly took several hours by tedious, expensive manual methods to remove splashed-on, hardened concrete and old paint from concrete mixers before reconditioning, you can now do this job in HALF the time or less . . . and MORE EASILY . . . by using Oakite materials specially designed for this work.

For every degreasing, cleaning, paint stripping or de-scaling job, there are SAFE, performance-proved, FAST-WORKING Oakite materials and methods available that will help you get MORE and LONGER service from your equipment, SPEED-UP maintenance and CONSERVE manpower!

IT'S FREE!

This newly revised and enlarged, 24-page manual . . . yours FREE for the asking . . . tells how more maintenance men are cleaning construction equipment and road building machinery faster, easier, better. Write for YOUR copy TODAY!

OAKITE PRODUCTS, INC.

24G Thames Street, NEW YORK, N. Y.

Representatives in All Principal Cities in the U. S. and Canada

STRENGTH

... to finish whatever it starts.

... to rip through toughest going.
... to ram the dipper deep into the bank.
... to resist buckling and fracturing.
... to absorb shock loads.
... to pile up profits for you.

When equipment breaks down, production schedules are knocked into a cocked hat and profits fly out the window.

That's why Byers builds shovels and cranes to "stand up and take it." Open hearth castings, uniform rolled steel sections, annealing, heat treating, anti-friction bearings, balanced design . . . all contribute to Byers' reputation for building sturdy shovels and cranes.

This is another reason why you should investigate Byers ⅜ to ¾ yd. sizes.

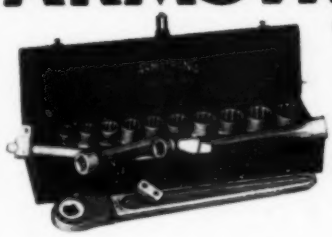
Modern CRANES and SHOVELS

BYERS

RAVENNA, OHIO

ARMSTRONG

WRENCHES



— open end
— Box Socket
— Detachable Socket
— Construction Ratchets

There are ARMSTRONG Wrenches for your every need and each is the finest tool of its type.

ARMSTRONG Socket Wrenches extensions and handles are Chrome-Vanadium Steel. Ratchets are drop forged steel and the patented ARMSTRONG Drivelock locks sockets, driver, ratchets and handles to each other — will not knock or pry apart, sockets can not fall off.

ARMSTRONG Giant Construction Ratchets are *drop forged* steel. Nut sockets are *machined* from solid bar stock.

ARMSTRONG Drop Forged

Structural and Construction Wrenches come in several types, in high carbon or Chrome-Vanadium steel. Large stub end box socket wrench takes long slip over handles.

Write for Catalog

ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
334 N. Francisco Ave.
Chicago, U.S.A.
Eastern Warehouse & Sales:
199 Lafayette St., New York

LUBRICANTS AND FUELS ON WAR PROJECTS—**Gulf Oil Corp.**, Pittsburgh, Pa. (10 pp., illustrated.) Action photographs of wide range of war construction projects show various types of equipment using this company's lubricants and fuels to insure trouble-free performance. Types of work include airports, highways, industrial plants, dams for flood control, sewers, pipe lines, housing, munitions works, army camps, shipyards and bridges. Among types of equipment illustrated at work are tractor-scrapers, motor trucks, wagon drills, draglines, power shovels, cranes, air compressors, concrete mixers, finishing machines, and truck-mixers.

★ ★ ★

SAND-ASPHALT ROAD MIX—**The Asphalt Institute**, 801 Second Ave., New York, N. Y. (12 pp.) Specification RM-3 for sand-asphalt road-mix course on natural sand subgrade covers requirements for materials, equipment, construction and methods of mixing by either blading and dragging or traveling mixer plant.

★ ★ ★

SPRAY EQUIPMENT—**Eclipse Air Brush Co., Inc.**, 390 Park Ave., Newark, N. J. (32-p. 8½x11-in. booklet, illustrated). Covers complete line of spray equipment for both manual and automatic operation, in addition to Pneumix air-motored agitators for all mixing jobs in batches up to 200 gal. Introductory section of catalog outlines reasons for low pressure principle under which all Eclipse spray equipment operates.

★ ★ ★

Beaded Traffic Lines

(Continued from page 70)

nance of the state highway system. Special equipment, developed over a period of years by highway engineers to mark the center line of paved roads, has been adapted to apply the yellow paint and the beads. This equipment makes it possible to apply a yellow line on either or both sides of the center line at the same time, while moving at a speed of about 10 mph.

The yellow paint is sprayed on the surface, making a line 4 in. in width. Immediately behind the paint spray are tubes which carry the beads and drop them into the quick-drying paint. Both the quantity of the paint and beads must be carefully regulated to obtain a line which does not smear and which has the greatest reflecting and wearing qualities without wasting beads.

Five-Man Crew

A crew of five men is required for marking no-passing zones. One man drives the "center-liner," keeping it in the correct position to have the yellow lines parallel to the center line without

(Continued on page 86)

PONY

Solid Shank
FEATHERWEIGHT
Shovels

•

PERFECT BALANCE

A new redesigned socket gives to the PONY Solid Shank Shovel the perfect balance which no other solid shank shovel has.

Equipped with
SHOCK BAND

The famous ABW Shock Band gives to the shovel greater handle strength. This is a patented feature of PONY Solid Shank Shovels.

Ask Your Jobber

AMES Since 1774

AMES BALDWIN WYOMING CO.
Parkersburg, W. Va. North Easton, Mass.

ABW PRODUCTS
SHOVELS FORKS
SPADES HOES
SCOOPS RAKES
POST HOLE DIGGERS
AGRICULTURAL HANDLES

The Care and Feeding of Rock Crushers

No. 1 of a series in the interests of war-time conservation

Proper Feeding of Materials

Avoid feeding stone that is too large for the crusher opening as it is certain to increase wear and cut production. As long as a large rock chokes the mouth of the crusher, no new material can be fed and an empty crusher is non-productive. Avoid dumping directly into crusher mouth as big rocks may be in the load to choke and damage equipment and its removal is a slow, tedious job.

Don't ever use a sledge hammer to break a large rock in the crusher while it is running. An accident with the sledge might easily result in serious damage to the crusher. It is much safer to stop the crusher. Better still—be sure all rock is reduced to the proper size before bringing it up to the crusher.

Use a dump box or ramp for handling incoming material, feeding by rake or shovels and breaking pieces too large for feed by hand. Of course, an apron or conveyor feeder dumping onto a grizzly or screen is preferred because it provides a steady feed and allows for by-passing fines, lessening the amount of material going through the crusher, reducing wear and increasing plant capacity.

Removal of excess clay avoids packing of the crusher jaws and slippage. Removal of tramp iron in the field or on the conveyor avoids costly breakdowns.

Universal Crushers and Crushing Plants are built for long time trouble-free service—proper care and maintenance will greatly extend their useful service life.

UNIVERSAL ENGINEERING CORPORATION Formerly the Universal Crusher Co.
327 8th Street, W. Cedar Rapids, Iowa

UNIVERSAL

CRUSHERS, PULVERIZERS, COMPLETE PLANTS, SPREADEROLLERS, PORTABLE ASPHALT PLANTS

RITECURE

for All Concrete Construction

IN CURING CONCRETE... It's the Solids that Count

The RITECURE film with 60% solids gives wide coverage and perfect curing

FILM or membraneous curing of concrete structures is simple and economical. For vertical surfaces it provides about the only practical way of curing at all.

But the film to be fully effective must be impervious over its entire surface and stay that way throughout the critical curing period. Obviously the amount and character of solids remaining after the carrier has evaporated are important.

RITECURE contains 60% solids. It dries into a thin but tough, durable film with considerable elasticity. Its spreading qualities assure full coverage without the need of excess amounts. More than 2,000,000 square yards of concrete a month are being cured with RITECURE. Buy solids —not solvents.

RITECURE The TRANSPARENT CURE

A Transparent Membrane for Curing Concrete

RITECURE *is sold by:*

THOMPSON MATERIALS CO.
204 West St.
New York, N. Y.

CURING MATERIALS CO.
2130 Jane St.
Pittsburgh, Pa.

A Product of: THE JOHNSON-MARCH CORPORATION, 52 Vanderbilt Ave., New York, N. Y.

12-JM-2

(Continued from page 85)

overlapping; one man rides on a rear platform to regulate the flow of beads and paint and an assistant drops warning flags along the new line to warn motorists not to drive across the line until it has dried. The other two men travel in a truck which carries supplies of paint and beads and also collects the flags after the paint has set sufficiently to prevent "tracking" when crossed.

Prior to the application of yellow lines, an inspection is made to locate all points where visibility ahead is less than 750 ft. The beginning and end of such zones are indicated by marks on the pavement which later guide the operator of the marking equipment.

★ ★ ★

On-the-Job Maintenance

KEEPS CONVEYOR BELTS ROLLING

(Continued from page 60)

immediately in front of the loading chute, to assure good formation of load and to prevent spillage. Their use throughout the length of a belt, however, should be resorted to only when absolutely necessary to prevent excess spillage. Even then a yielding material, like old belt, should be used, as it will cause less damage than wooden boards. But regardless of what they are made of, skirt-boards should never be allowed to rub against the belt at any point.

Saving Belt by Reducing Speed

One study that is especially important these days involves the factors of conveyor belt load, running speed and net rate of material delivery by the belt. Running a belt at full load, but at reduced speed, will deliver as much material per hour or per day as running the belt with a light load, but at faster speed.

It might be assumed that the two factors of belt speed and belt load would exactly counterbalance each other; but, from the standpoint of wear, the effects are quite different, as indicated by these facts: (1) Only that part of the load which actually touches the belt causes wear, and (2) a fully-loaded belt, moving more slowly to pick up its full load, passes under the loading chute less frequently in the course of a day's or an hour's operation than a lightly-loaded

(Continued on page 88)

NATION-WIDE SERVICE FACILITIES FOR ADAMS USERS

Wherever you are, an authorized Adams dealer or factory branch is nearby and ready to give immediate service.

★ ★ ★

ALABAMA
- Ed. Gantt Machinery Co., Inc. — Birmingham
- Ray-Brooks Machinery Co. — Montgomery

ALASKA
- Glenn Carrington & Co. — Fairbanks
  Home Office: Seattle, Wash.

ARIZONA
- O. S. Stapley Co. — Phoenix

ARKANSAS
- Little Rock Road Machinery Co. — Little Rock

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- Butte Tractor & Equipment Co. — Sacramento
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- J. D. Adams Company — San Francisco
- J. D. Adams Company — Los Angeles

COLORADO
- McKelvy Machinery Company — Denver

CONNECTICUT
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DISTRICT OF COLUMBIA
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HAWAII
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IDAHO
- Intermountain Equipment Co. — Boise
- Intermountain Equipment Co. — Pocatello

ILLINOIS
- A. E. Hudson Company — Peoria
- A. E. Hudson Company — Springfield
- Glasco Tractor & Equipment Co. — Salem
- Great Lakes Supply Corp. — Chicago

INDIANA
- Matt W. Foster — Newburgh
- J. D. Adams Company — Indianapolis

IOWA
- Herman M. Brown Company — Des Moines

KANSAS
- S. H. Denney Road Machinery Co. — Wichita

KENTUCKY
- Brandeis Machinery & Supply Co. — Louisville

LOUISIANA
- Industrial Tractor & Equipment Co., Inc. — Baton Rouge

MAINE
- Maine Truck-Tractor Co. — Portland

MARYLAND
- Paving Supply & Equipment Co. — Baltimore

MASSACHUSETTS
- Tractors, Inc. — Newton Highlands

MICHIGAN
- Bark River Bridge & Culvert Co. — Bark River
- J. D. Adams Company — Grand Rapids
- J. D. Adams Company — Detroit

MINNESOTA
- Thorman W. Rosholt Co. — Minneapolis
- Thorman W. Rosholt Co. — Duluth

MISSISSIPPI
- Mississippi Road Supply Co. — Jackson

MISSOURI
- Missouri-Illinois Tractor & Equipment Co. — St. Louis
- Noel V. Wood, Inc. — Kansas City

MONTANA
- Industrial Equipment Co. — Billings

NEBRASKA
- Nebraska Tractor & Equipment Co. — Omaha

NEVADA
- Allied Equipment, Inc. — Reno
- Clark County Whls. Merc. Co., Inc. — Las Vegas
- Nevada Equipment Co. — Elko

NEW HAMPSHIRE
- R. C. Hazelton Co. — Chester

NEW JERSEY
- Ross, Young, Dilts Corp. — Trenton

NEW MEXICO
- McChesney-Rand Equipment Co., Inc. — Albuquerque

At air training fields throughout the nation thousands of eager young Americans tackle the world's toughest training course in an effort to earn their "Wings" and a chance at combat duty. . . . In the building of these training fields Adams equipment plays an important part. . . . Hauling scrapers and elevating graders move vast quantities of earth to change hills and valleys into smooth, level landing fields. Motor graders level and grade the runways, aprons and taxi-ways, mix and lay stabilized surfacing materials. On every job the dependability and versatility of Adams machines help constructors keep pace with the ever-expanding air training program. . . . When Victory is won, machines exceeding even wartime performance standards will be ready for you. They'll be worth waiting for!

J. D. ADAMS COMPANY • INDIANAPOLIS, INDIANA

Adams motor graders, leaning wheel graders, elevating graders, hauling scrapers, tamping rollers, bulldozers and road maintainers are used by allied forces throughout the world.

● *This Adams heavy-duty motor grader is one of eight operated by the U. S. Army in constructing the runways of a new air training field in the south. . . . The two Adams hauling scrapers shown below are used by the Army on the same job.*

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- Howard-Cooper Corporation — Portland
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PENNSYLVANIA
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- Brooks Equipment & Manufacturing Co. — Knoxville
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TEXAS
- Jess McNeel Machinery Co. — San Antonio
- Jess McNeel Machinery Co. — Alice
- Plains Machinery Company — Plainview
- Browning-Ferris Machinery Co. — Dallas
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UTAH
- The Lang Company — Salt Lake City

VERMONT
- Vermont Road Equipment Co. — Montpelier

VIRGINIA
- Municipal Sales Company — Richmond
- Roanoke Tractor & Equipment Corp. — Roanoke

WASHINGTON
- Howard-Cooper Corporation — Spokane
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- Glenn Carrington & Co. — Seattle
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TO KEEP YOUR EQUIPMENT ROLLING . . .

service and overhaul it regularly. See your nearest Adams dealer for new machines available under priority rating and for repairs and service on your present equipment . . . Wherever you are or wherever you go Adams co-operative service is near at hand.

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ROAD-BUILDING AND EARTH-MOVING EQUIPMENT

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WHEEL-TRACTOR CRANES
Ask the Men Who Handle 'Em!

"We're pals — me and my Mercer Crane! Just show us the work...we'll clean it up in jig time. My No. 7's a real sweetheart — it's just about the smoothest tonnage tackler on wheels!"

Live Boom, Telescoping Gooseneck Boom Head with Boom Rollers.

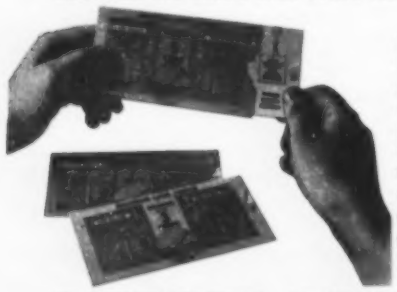
Standard Live Boom equipped with double sheaves for main and topping hoist lines.

"Mercer—that's MY Crane! It picks 'em up and puts 'em down just like it was no effort at all! You'll go a long way, Buddy, before you'll find a Mercer Crane that can't take it!"

A Single Hoisting Line that goes over the top—designed especially for Stevedores.

3, 5 and 7 Ton Capacities!

Compact, fast, sturdy...they deliver hard, continuous service at low cost. Gasoline-powered . . . one-man operation. Single or double-drum hoists. Cushion rubber or pneumatic tires. Special booms and heads for every type of lifting, carrying and loading. Parts standardization means simple adjustment and servicing in the field. Our new Catalog No. 65 completely illustrates and describes the entire line. Write for your copy today.



To assist Mercer Crane Operators and help conserve equipment, we offer a group of "Maximum Load Finders" covering all models. These jumper-pocket size "rules", shown at the left, tell the operator at a glance exactly the maximum load he can safely carry at various distances in front of the bumper plate. These handy gadgets are yours for the asking!

"THE NAME THAT CARRIES WEIGHT"

MERCER ENGINEERING WORKS, INC.

Materials Handling Equipment

30 CHURCH STREET, NEW YORK, N. Y.

WORKS: Clifton (Allwood), N. J.

(Continued from page 86)

but faster-traveling one. The ratios will vary with different installations, but insistence on optimum balance between load and running speed can contribute greatly to belt longevity.

Idler Spacing

Spacing of idlers may be considerably more important to belt life than is usually appreciated. A conveyer is originally designed with the idler carriers spaced to prevent sag between carriers. Thus the idler spacing is dependent upon the tension in the belt. If there is too much sag, the load shifts as it moves from idler to idler, and this shifting not only causes extra wear on the belt surface but also requires additional power.

Operators can save belt wear and power by graduating the idler spacing from one end of the conveyor to the

DAMAGED AREAS in belt cover are prepared for repairs with portable vulcanizer of type used for splicing belts.

other, proportionate to the tension and sag in the belt. On the carrying side, this tension is greatest at the head pulley and gradually eases off to its minimum at the tail pulley. The spacing of the idlers at various points depends upon the load, the belt tension, the belt width and the inclination of the conveyor; substantial savings are possible when the idler spacing is adjusted properly.

Damage Through Exposure

Hazards of light, heat, cold and moisture have as much influence on belt mortality as the mechanical factors already considered. All rubber tends to crack under prolonged exposure to sunlight, as a result of the effect of ultra-violet rays in promoting oxidation and hardening of the rubber surface. There are modern compounds made to retard this action, but nothing has been discovered to overcome it completely. For that reason, no rubber belt can be expected to last as long in the open as when protected from the sun.

Rubber belts stand temperatures up to 150 deg. F., and special hot-material belts are made that can carry loads where the temperatures go considerably higher. That fact should not blind us, however, to what is almost the first rule

(Continued on page 90)

When JETTING *is a Must*

YOU'RE SAFE WITH MONOTUBES —AND AHEAD OF SCHEDULE, TOO!

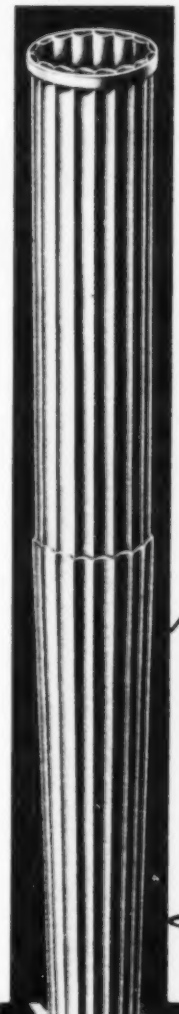
STURDY, all-welded steel Monotubes can be safely and speedily jetted to proper butt elevation without the danger and delay of water-filled piles. They simplify and speed your foundation building problems, help you finish *more* contracts at *less* cost.

No matter what your next job may be; no matter what soil conditions you may have to contend with; you'll find yourself "out in front"—with Monotubes.

Wherever Monotubes are used for the installation of cast-in-place concrete piles, they offer you these four outstanding advantages:

1. ***SPEEDY Handling.*** Monotube steel casings are light in weight for fast and economical handling.
2. ***SPEEDY Driving.*** Tapered Monotubes are so strong and rigid they require no heavy core or mandrel and can be driven with average job equipment (crawler crane, equipped with standard leads and hammer).
3. ***SPEEDY Extension.*** Use of Extendible Monotubes permits installation of varying pile lengths on the job without delay or waste—even in low headroom.
4. ***SPEEDY Inspection.*** Hollow, tubular design enables you to inspect casing quickly and thoroughly from top to toe, prior to concreting.

Union Metal Monotubes are available in a gauge, size, and taper to meet your requirements, and Union Metal engineers are always at your service. Write today for your copy of Catalog 68A.



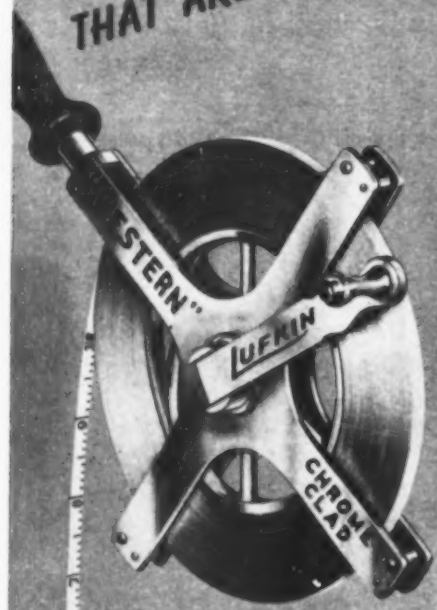
Remember

"More Production means Axis Destruction"

THE UNION METAL MANUFACTURING COMPANY CANTON, OHIO

LUFKIN
CHROME CLAD STEEL TAPES

EASY TO READ MARKINGS THAT ARE DURABLE



"WESTERN" FOR HEAVY DUTY

If you want an extra rugged, extra durable steel tape that's easy to read, get the Lufkin "Western" with the new Chrome Clad line. The jet black markings stand out prominently against a satin chrome surface that won't rust, crack, chip, or peel and is easy to clean. The line is substantially heavier than engineers standard weight. See it at your dealers and write for our free catalog 12B.

LUFKIN
SAGINAW, MICHIGAN • New York City
TAPES · RULES · PRECISION TOOLS

(Continued from page 88)

in rubber preservation: "Heat is the enemy of rubber." It is of primary importance that exposure to heat be kept within the limits for which a belt is designed—the farther within those limits the better.

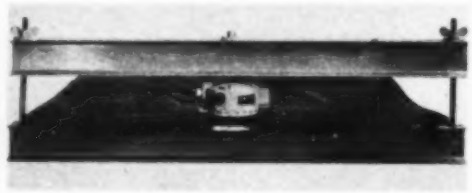
Although cold itself has almost no harmful effect upon rubber, wet belts have been known to freeze overnight to the pulleys or idlers, so firmly that some of the rubber was torn away when the conveyor line was re-started. Whenever there is a possibility that such freezing has taken place, the system should be checked carefully before starting.

Another kind of "freezing," of a mechanical nature, may cause disastrous damage. Idlers which become "frozen" through lack of grease or clogging with sand or dust, have been known to wear completely through, leaving a knife-like edge of steel which can rapidly ruin the belt structure. In seeking to avoid this type of error through generous oiling or greasing, conveyor maintenance men must be careful not to overdo the lubrication, because oil is destructive to rubber, causing it to swell and rot to such an extent that the rubber cover will peel away from the fabric.

Effects of Moisture

If there is excessive moisture, in time it will penetrate to the fabric in a belt even though the rubber covers are intact. This penetration causes the cotton to shrink, shortening the belt. The shortening does no harm, provided the operator is careful to ease off the take-up tension in order to compensate for the shrinkage.

Mildew, of which there are many species, is a by-product of moisture, and when belts are to be used under moist conditions, an order for new belts should specify anti-mildew treatment, which means impregnating the fabric with



SMALL ELECTRIC VULCANIZER is convenient and inexpensive tool for making cover repairs in belt.

mildew-inhibiting chemicals. But, because no chemical has yet been discovered which will absolutely prevent this mildew growth, the safest plan is to keep covers intact by inspection and repair, thereby sealing off all air from the fabric. Without oxygen, mildew can do no damage to the fabric, and it has no harmful effect on the rubber.

Cord fabric construction of the kind used in cord conveyor belting is an added modern protection against fabric deterioration from moisture. In old-style woven fabric, the entry of moisture through even the tiniest cover break resulted in its spread over a con-

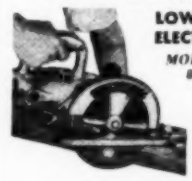
Cut Material Costs
Reduce Placing Time
Get Stronger Concrete
with Mall VIBRATORS

Equipped as a Concrete Surfacer • *Placing a Stiff Mix Concrete*

Operates 8 Tools

Concrete Vibrator, Concrete Surfacer, Form Sander, Wire Brush, Drill, Chain Saw, Circular Saw, Sump Pump

- Places low-water-cement-ratio concrete better, faster
- Eliminates honeycombs and voids
- Assures a stronger bond with reinforcement
- Permits an earlier stripping of forms
- Operates 2⅜" x 19" Vibrator
- Variable engine speeds 1000 to 3000 r.p.m.
- Countershaft speeds 3000 to 7000 r.p.m.



LOW-PRICED ELECTRIC Mall Saw! MODEL 85

A big time and labor saver on form construction above or below grade. Also saves material as small ends and pieces can be salvaged for bracers, stoppers and spreaders. Adjustable for depth or bevel cuts to 45 degrees. Balanced for safe use with either hand.

Available on Priority Orders — write for literature and prices

MALL TOOL COMPANY
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CONSTRUCTION WORKERS WEAR
TOWER'S FISH BRAND
OILED WATERPROOF WORK CLOTHING
For Wet Weather Protection

With rubberized work clothing practically out for the duration, construction workers are turning to TOWER'S dependable oiled suits, coats and hats. Longwearing, dependable and practical in every detail they give the utmost in freedom of movement and wet weather protection. While our Government has first call on TOWER'S production, there is still a limited supply available for use by workers in essential industries. Ask your Dealer.

Write for folder CW—"PRESERVE YOUR SLICKER"

TOWER'S FISH BRAND
A. J. TOWER CO.
BOSTON, MASS.
FAMOUS FOR OVER 106 YEARS

WRITE TODAY FOR THIS 24 PAGE BUCKET CATALOG

Just off the press is this two-color, twenty-four page catalog packed with the facts you'll want to know about buckets. Which bucket is best suited to the job and what each type (rope-reeve, power-wheel, special-purpose, open-type grab and link-type) will do is clearly explained by word, chart and photograph. If you haven't received your copy, write for it today.

THROW YOUR SCRAP INTO THE FIGHT!

INDUSTRIAL BROWNHOIST

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COMMERCIAL

TUNNEL LINER PLATES and SUPPORTS

... SPEED ALL TYPES OF TUNNEL CONSTRUCTION!

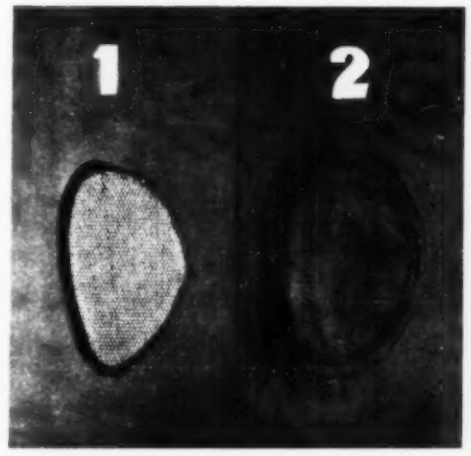
Here's a small water diversion tunnel where COMMERCIAL Tunnel·Supports have been employed ... they have proved important in saving time, expense and providing greater safety under hazardous conditions. Along with well planned procedure, there's no greater factor in efficient tunnel construction than COMMERCIAL Plates and Supports. In types and shapes for every kind of ground ... for every size tunnel. Make COMMERCIAL your choice on your next tunneling project.

The COMMERCIAL SHEARING & STAMPING CO.
YOUNGSTOWN, OHIO

siderable area because of the "wicking" action (similar to that of a blotter picking up ink) of the cross-threads of the fabric. But because the cords in the cord fabric construction are insulated from one another by rubber, this wicking action is confined to the cord or cords moistened at the actual point of entry.

Field Vulcanizing

Splicing and repair of rubber conveyor belts by the vulcanization method are two excellent examples of "on-the-job" maintenance made quick and efficient through tools developed by Ameri-



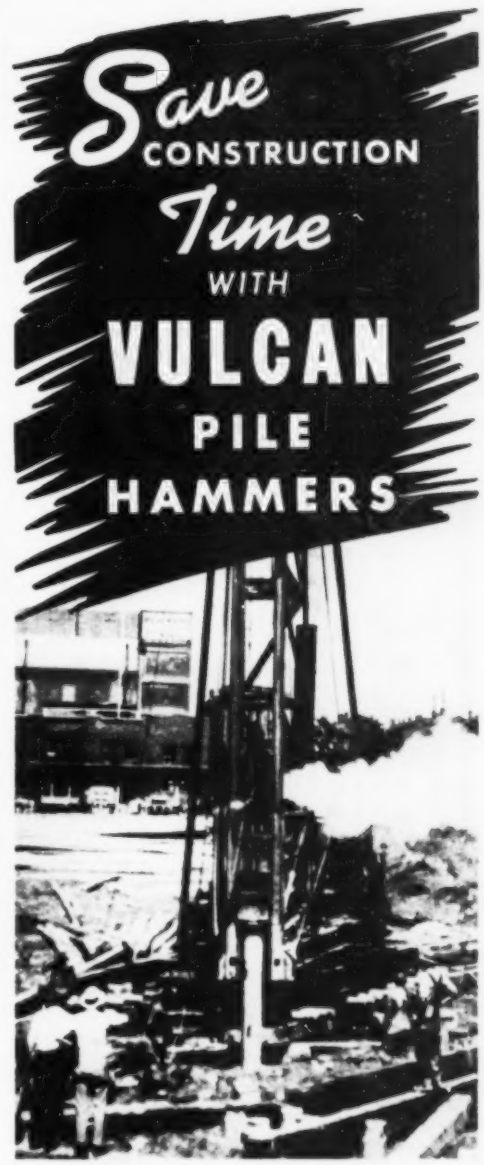
TEMPORARY REPAIRS should be made even though vulcanizing equipment is not available. After cutting out piece of cover where loose and trimming edges at angle of 45 deg. with knife kept wet during process, Fig. 1; repair patch is made in accordance with directions, producing final effect shown in Fig. 2.

can industry to repair its own applied equipment. Probably no improvement in conveyor belt practice has done more to save maintenance time and expense than perfection of the field vulcanized splice. Simple and inexpensive splice vulcanizing equipment, operated by electric current, is now available in all parts of the country through distributors. The vulcanized splice not only has twice the strength of any fastener joint but possesses numerous other advantages over splices made with metal fasteners.

Especially significant in these days are the convenience and effectiveness of making on-the-job vulcanized repairs on conveyor belts. For this purpose, the large vulcanizer used for splicing can be applied; but there are smaller electric vulcanizers, designed especially for patching, which make efficient repairs.

Unremitting vigilance in continually repairing cuts, chafed spots, gouges and snags in the covers and edges pays substantial dividends through greatly lengthened belt life and increased tonnage delivery. Grit and moisture can penetrate to the fabric through small wounds and, under constant kneading and flexing of the belt on idlers and pulleys, gradually enlarge the damaged areas inside the carcass until the

(Continued on page 92)



★ **Super-VULCAN Open-Type Differential-Acting Pile Hammers with twice the blows per minute—with more penetration of each pile per blow—are rendering important aid so that gains on construction time are realized.**

Simple design, positive action, easy to operate, the Super-VULCAN Open-Type Pile Hammer fits the same leads and uses the same accessories as the Warrington-VULCAN Single-Acting Pile Hammer which delivers a moderate frequency of low velocity blows from a relatively heavy mass of ram. Write for fully descriptive bulletins on our complete line.

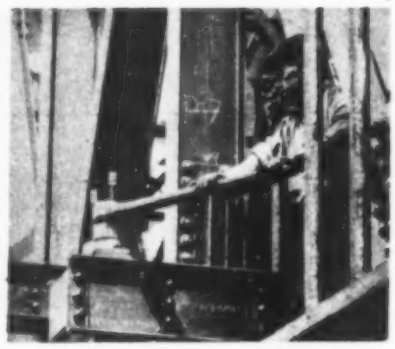
We also make Super-VULCAN Differential-Acting Closed-Type Steam Pile Hammers for under water work, and VULCAN Pile Extractors. Write for bulletins.

VULCAN IRON WORKS
Since 1852

331 North Bell Avenue

Chicago **Illinois**

Bridge Constructors Depend Upon



LOWELL
Reversible Ratchet
WRENCHES

See how each pawl, when engaged, transmits leverage from the solid stock of the handle, direct to the gear, in a straight line and with a square contact. The pawl is in compression only—no shear, no tension, no torsion. The shipper carries none of the load. This strong construction insures steady service.

For running up nuts on anchor bolts and connections, bridgemen need wrenches that will work fast and SAFELY.

The LOWELL "Steel Socket" Bridge Builders' Wrenches—with their positive guarantee that handles will not break—meet the tough requirements of big bridge jobs.

Built in a wide range of types and sizes to cover many needs of the engineering-construction field.

Have patience with your dealer if he is unable to furnish all of the numerous LOWELL types and sizes, because we are engaged, for the duration in supplying the needs of our Armed Forces.

LOWELL WRENCH CO.

1869 · WORCESTER, MASS., U. S. A. · 1942

At HOME and ABROAD

Moretrench Wellpoint Systems are Keeping 'em Dry!

On hundreds of war projects—from sewers to dry docks—MORETRENCH WELLPOINT EQUIPMENT speeds foundation operations by quick, dependable dewatering.

Our organization is at your service. Call us at New York—Barclay 7-0463—for immediate action.

MORETRENCH CORPORATION

90 WEST STREET, NEW YORK

ROCKAWAY, N. J. • JOLIET, ILL.
NEW ORLEANS, LA.

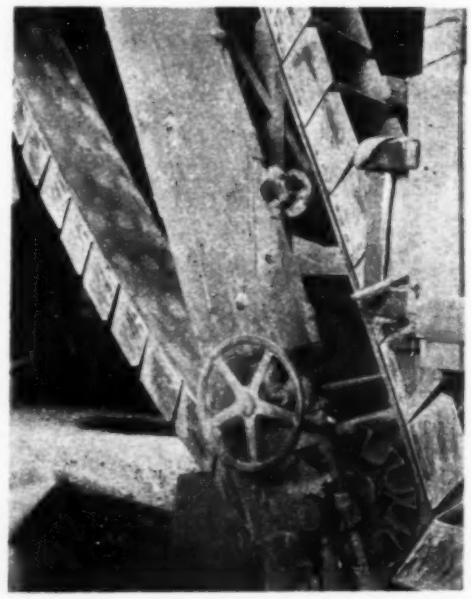
(Continued from page 91)

strength of the belt is hopelessly impaired. Only by keeping everlastingly on the job can belt-conveyor maintenance attain its greatest effectiveness.

Crooked Running

Many premature belt failures result from crooked running. Diagnosis of the cause of the crooked running often is difficult. When the same part of the belt always is trying to run off the pulleys, the cause probably is crookedness in the belt itself.

Failure to cut the belt in square at the splice is the common cause of crookedness in a belt. Before making a cut in a belt, the safest plan, particularly with wide belts, is to mark a center line on the belt for a distance of at least 10 to 15 ft. back from the location of the cut. Laying out a center line of this length is



ON BUCKET ELEVATORS, where it is impossible to keep loose material from getting between elevator belt and boot pulley, squirrel cage type of pulley permits trapped material to work clear instead of being ground into surface of belt.

advisable because the edges of the belt are not always perfectly true. The cut should be made at right angles with this center line.

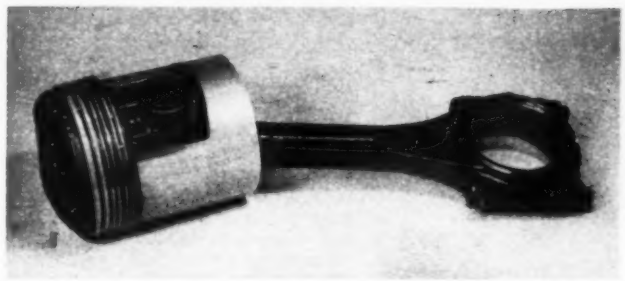
Wearing off of one edge of the belt may cause it to run crooked. If the belt is operated under high tension, the worn edge may stretch more than the rest of the belt. An opposite effect may be produced in this edge under extremely moist conditions, if the exposed fabric absorbs moisture and shrinks.

Alignment of Idlers

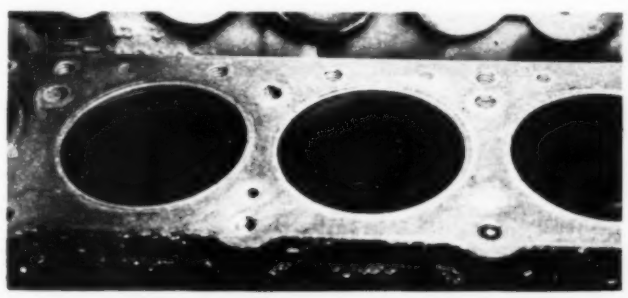
If a belt keeps climbing sideways on the same idlers, the fault is not with the belt but with the alignment of the idlers. Usually the carrier which causes the trouble is the second or third behind the point where the belt climbs out of line. Idlers should always be kept at right angles with the center line of the belt. Correct location of the carriers

(Continued on page 94)

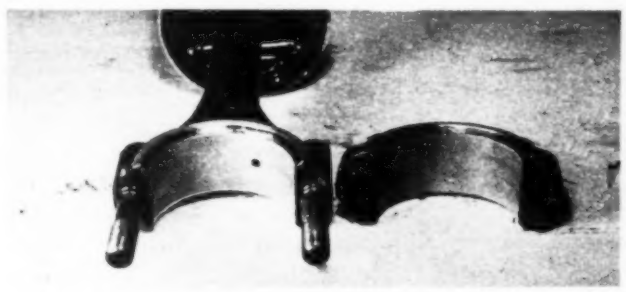
201,000 MILES WITHOUT PULLING A PISTON



Typical piston of ambulance engine that operated 201,000 miles without replacing. *All pistons were put back* in service after inspection. Wrist pins showed less than .001 wear.



At the point of greatest wear cylinder taper was less than .006 of an inch. Before this inspection, valves had not been ground for 109,000 miles, yet average compression for all cylinders was 92.5 pounds.



All but one connecting rod bearing, and all main bearings, ran the full 201,000 miles without replacing.

AN EXAMPLE OF FLEET CONSERVATION SERVICE AT WORK

The engine parts shown at left are pictured as they were removed after 201,000 miles of operation in hard daily service in an ambulance fleet.

Details of the replacements and repairs that have *not* been made are briefly outlined under each picture. This engine's record is not an exception in this fleet. Another practically duplicated this record with 193,000 miles of operation.

And here is the reason for this remarkable example of trouble-free operation. Good preventive maintenance methods of the garage superintendent headed off the minor engine failures which frequently develop into serious repair jobs if they go unnoticed. Motor oils, fuels, and lubricants were chosen for the particular operating conditions on this fleet.

In maintenance and product recommendations the Standard Automotive Engineer and garage superintendent worked together closely. Accurate records were kept as a check on the performance of each unit. Besides long mileage and low maintenance, this engine averaged over 13 miles per gallon of gasoline and 100 miles per quart of oil including changes.

HERE'S HOW TO GET THIS FLEET CONSERVATION SERVICE

If you are located in the states listed below, take advantage of the Fleet Conservation suggestions which a Standard Automotive Engineer has for you. Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago, Illinois, for the Engineer nearest you. In Nebraska, write Standard Oil Company of Nebraska at Omaha.

COLORADO · ILLINOIS · INDIANA · IOWA · KANSAS · MICHIGAN MINNESOTA · MISSOURI · MONTANA · NORTH DAKOTA · WYOMING SOUTH DAKOTA · WISCONSIN

Sign up your fleet in the ODT Truck Conservation Corps. Help in this vital war effort by keeping your trucks rolling for the duration.

Pledged U.S. TRUCK CONSERVATION CORPS

OIL IS AMMUNITION...USE IT WISELY

STANDARD OIL COMPANY (INDIANA)

FLEET CONSERVATION SERVICE

MOVE MORE SCRAP...

...faster...easier...cheaper

America needs scrap iron and steel . . . millions of tons of it . . . the war can't be won without it. Every mill, factory, shop, mine and other organization of American industry must contribute every available pound of scrap metal to the nation's war effort. Make your clean-up complete . . . in your home and at your plant. Do your share to get all the needed scrap into the fight.

Clyde Whirleys have proven to be ideal machines for moving scrap. In the same way they handle coal, sand, gravel or any other kind of material at industrial plants, loading stations or on construction jobs . . . efficiently and economically.

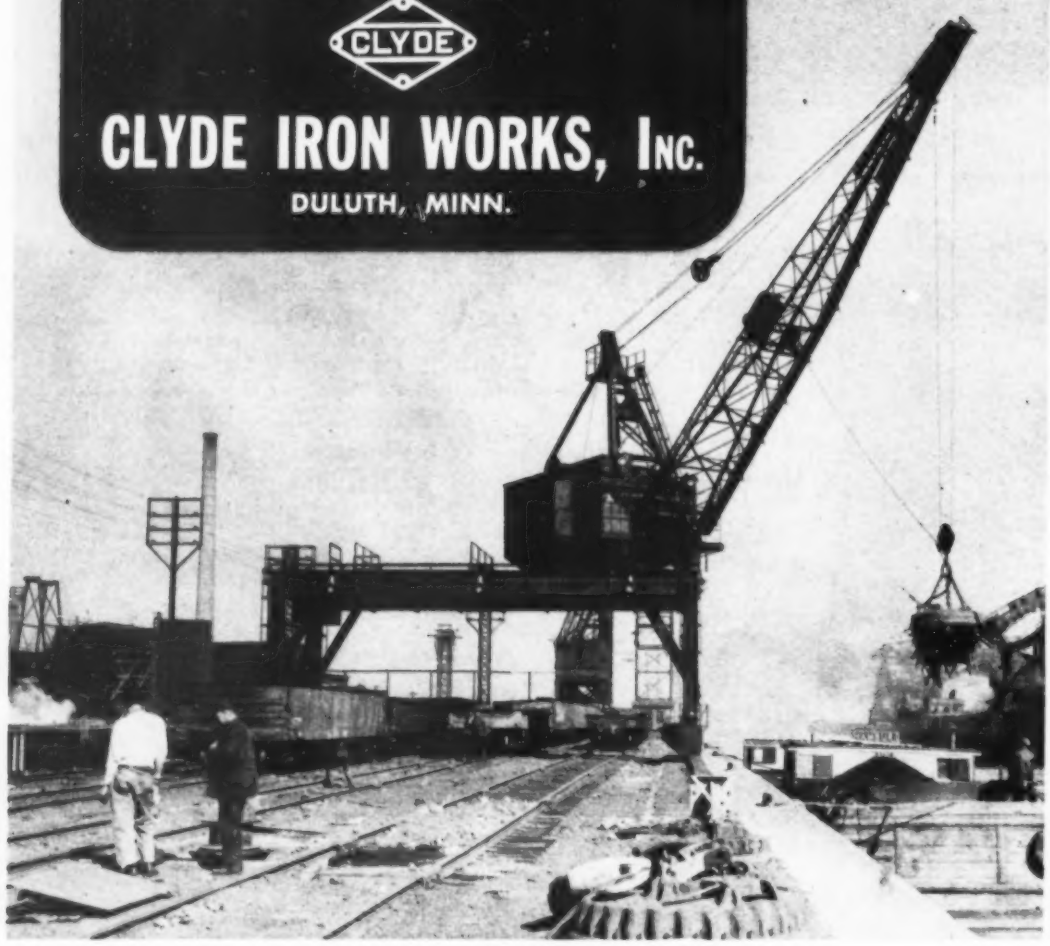
The long reaching booms of Clyde Whirleys, cover an exceptionally large area . . . their balanced design results in smooth and fast swinging with no strain on the center pin. Clyde's equalized wheel arrangement on the turntable insures against individual wheel overloading as the load on each wheel can be definitely determined.

Seven standard sizes to choose from with lifting capacities from 22,000 lbs. at 150 ft. to 140,000 lbs. at 35 ft. boom radius.

CLYDE

CLYDE IRON WORKS, INC.

DULUTH, MINN.

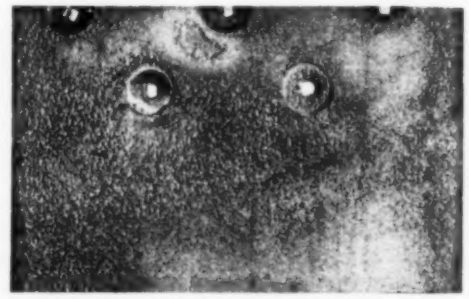


ARMY E NAVY

(Continued from page 92)

should be plainly marked on the idler frame to assure replacement in the proper position if the idlers ever are removed for repairs.

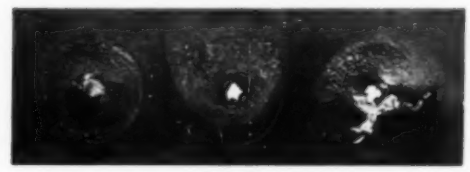
Horizontal middle rows of troughing idlers must make contact with the belt to steer it straight. Belts can run crooked because they have too many plies in proportion to the width. If a belt is operating with insufficient load to press the belt properly against the middle rolls of the carriers, this condi-



SLIPPING ON HEAD PULLEY of bucket elevator has worn belt through rubber cover into duck, wear being aggravated by abrasive material between pulley and belt. To remedy this condition, thicker rubber cover on belt and lagging on pulley are needed.

tion can be remedied by increasing the delivery or reducing the speed of the belt to permit a heavier load.

Unequal loading is a common cause of crooked running. The side of the belt which is more heavily loaded naturally seeks the middle of the carrier, causing the other edge to climb. Delivery of material from a chute not in line with the direction of belt travel is commonly to



TORN BUCKET FASTENING on elevator belt is result of accident, caused by crooked running of belt, in which bucket caught on projection in housing. Such accidents can be avoided by proper crowning of pulleys and regular inspection.

blame for unequal loading. Accompanying illustrations indicate means of correcting unequal loading and assuring proper load formation.

Crooked running sometimes is traceable to the fact that rolls on a return idler have become loose and have slid to one end of their shaft, permitting the belt to sag over one end of the idler and steer sidewise. A frozen idler which sticks on its shaft and refuses to turn will tend to deflect a belt. Where a conveyor is erected on poor foundations, settlement and resultant misalignment of supports may cause crooked running.

To straighten a belt that is running crooked, a few sets of self-aligning idlers, inserted at the critical point, may

(Continued on page 96)

DYNAMITE

THE BUILDER IN WAR AND IN PEACE

From a DU PONT "Cavalcade of America" broadcast over the coast-to-coast N.B.C. Red Network

AMERICA in the middle of the last century was an eager, vibrant young nation struggling to grow out to her wider boundaries —struggling, but balked. Then, in Switzerland, a man invented gun-cotton – in Italy, another man invented nitroglycerine – in Sweden, a man discovered dynamite—and science placed in her hand the great, mountain-moving lever that America needed.

There are old-time blasting men who remember the great nation-building jobs dynamite handled at the turn of the century; jobs like the Panama Canal, never before thought possible. Men who have worked with dynamite since Canal days, grateful for its safety, impressed by the amount of work it does, see in it a chemical tool of infinite potentiality for mankind's benefit, both for today and for the future.

Dynamite is a prime mover. In peace, America uses a million pounds of it every day – 350 million pounds of the various types each year, produced by 25 companies in 42 plants throughout the United States. Du Pont alone manufactures nearly 200 different types and grades of dynamite. "Nitramon," to single out one Du Pont blasting agent, is the safest known. Used especially in quarrying and oil prospecting, "Nitramon" can be held in a flame or riddled with rifle bullets without danger.

In this war year, America will use an estimated 450 million pounds of dynamite. Dynamite is helping to produce more steel, more coal, more copper! Dynamite helps speed cantonments and airports; excavations and harbors. On one island outpost of the United States dynamite has quarried 20 million yards of rock for a single giant air base. Between British Columbia and Alaska, dynamite is helping to cut and surface a 24-foot roadway 1500 miles long – the Alaska Highway. In the Tennessee Valley dynamite has helped to bring power to our war industries from the great new dams – Norris, Hiwassee, Chicamauga, Cherokee and the others—to say nothing of Grand Coulee and Boulder and Shasta of the Great West. At one Navy ammunition storage dump it helped build 3000 igloos, as they're called, each one of which stores a quarter of a million pounds of ammunition – bad news for America's enemies!

Du Pont dynamites, weapons of production in wartime, in peace time help to bring us—*BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY.*

DU PONT

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Aimed at the Same Foe!

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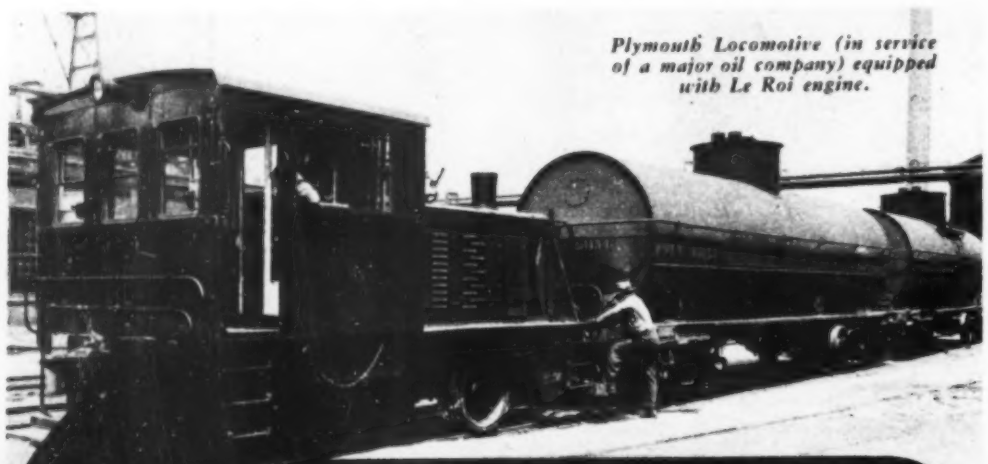
Heavy duty pumps dispense chassis, track, and gear lubricants at high speed through 30 foot hoses. Large irreplaceable tires are also quickly serviced through a convenient air line. Field servicing of construction machinery can be speeded up with less men . . . A letter or wire will bring a GRACO factory representative or a nearby distributor. Ask for Bulletin No. 122.

GRACO



Plymouth Locomotive (in service of a major oil company) equipped with Le Roi engine.

LE ROI POWERED

for more HP hrs. per $

. . . like many other types and makes of equipment vital to our war effort

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LE ROI COMPANY • MILWAUKEE, WIS.

(Continued from page 94)

prove effective. Self aligning idlers are available both for troughing carriers and return carriers.

Attempting to straighten a belt by unequal adjustment of the take-up screws is bad practice. End pulleys of a belt conveyor should always be kept in alignment. It is also a mistake to try to make a belt run straight by increasing the tension, as the added tension not only strains the driving mechanism but also puts an unnecessary stress on the belt.

Tilting Idlers

Experience has shown that a slight tilting forward of the idler carrier helps to keep the belt straight in its course, in somewhat the same way that crowning a drive pulley keeps the belt in the middle. Tilting of the carrier can be accomplished by shimming up the rear foot of the support on each side. Too much tilt may result in lack of full contact or excessive wear on the pulley side of the belt. The outer axis should be moved forward not more than $\frac{1}{8}$ to 3/16 in. It is advisable to use a template like the one shown in an accompanying illustration to make sure that the troughing idlers on both sides are fixed at the same setting. Idlers on reversing conveyors should not be tilted.

★ ★ ★

Tough Airport Grading Job

(Continued from page 45)

equipment on other projects became insistent, units were shifted from this job to other places.

Rubber-Tired Hauling Units — Exclusive of six Tournapulls, included in this general category, the job had 12 tractor-wagon outfits, 21 earthmoving trucks and 9 pick-up trucks. The tractor-wagon units, all bottom-dump and all powered by Cummins 200-hp. diesel engines, included 4 Euclids and 8 Oshkosh outfits with Four-Wheel-Drive tractors. Four of the latter units were of 15-yd. capacity, struck measure, and four had 13-yd. wagons. The wagons carried an average 17-yd. heaped load, equal to 12 or 13 yd. of pay dirt, the shrinkage being considerable, especially in the blasted material. Earthmoving trucks included fifteen 8-10-yd. units, mostly Macks and Internationals, with two International 6-8-yd. and five Mack 6-yd. trucks.

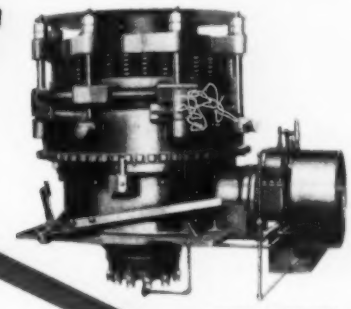
Power Shovels — To load the pneu-

(Continued on page 98)

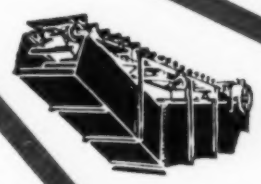
TELSMITH GRAVEL PLANT and QUARRY *Equipment*

When you modernize, expand or build a new plant—Telsmith machinery is the right answer to your production problems. From crushers to bin gates, every unit is designed, engineered, and built "right" *by Telsmith.* And Telsmith selective engineering service fits it to do the job you want done at the lowest operating cost. To push production to new peaks—buy Telsmith. Get Bulletin E-10.

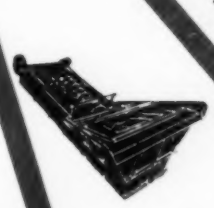
SAND TANKS



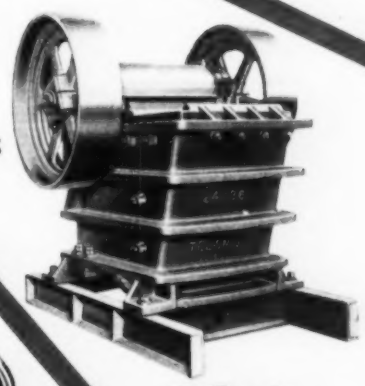
GYRASPHERE CRUSHERS



SAND DRAGS

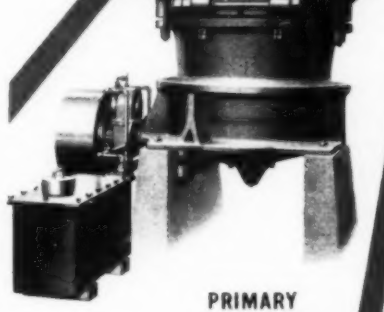


SAND CLASSIFIERS



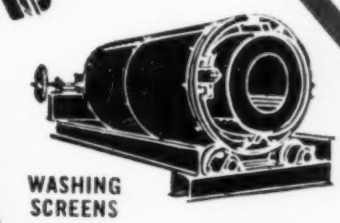
JAW CRUSHERS

BELT AND BUCKET ELEVATORS



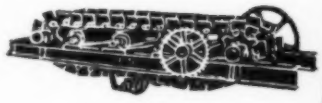
PRIMARY BREAKERS

REDUCTION CRUSHERS

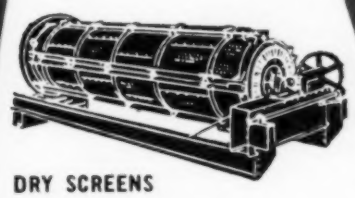


WASHING SCREENS

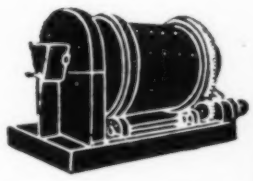
PULSATORS



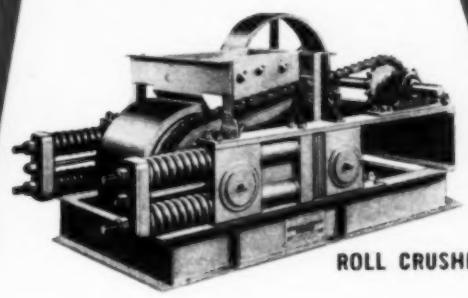
HEAVY DUTY FEEDERS



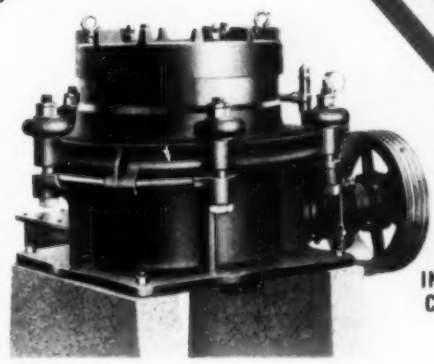
DRY SCREENS



SUPER SCRUBBERS



ROLL CRUSHERS



INTERCONE CRUSHERS

E-4

SMITH ENGINEERING WORKS, 510 E. CAPITOL DRIVE, MILWAUKEE, WISCONSIN

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(Continued from page 96)

matic-tired hauling equipment, the contractor operated an average of six power shovels, a Link-Belt 2-yd., two Bucyrus-Erie 1½-yd., and three Lorains (1¾-, 1½- and 1-yd.).

In addition, a Northwest 2½-yd. shovel worked with three big LeTourneau pneumatic-tired buggies drawn by Caterpilar D8 crawler tractors. Each of these buggies had a water-level capacity of 23 yd. and transported 17 yd. of pay dirt per trip. The Northwest shovel loaded nearly 6,000 yd. of pay dirt in 20 hr. of operation each day.

Tractor Scrapers

Including six 8½-yd. Tournapulls, powered by pneumatic-tired two-wheel tractors, the job used 27 tractor-scraper units. Thirteen Caterpillar D8 96-hp. diesel tractors were hooked up to LeTourneau scrapers (three 18-yd. and ten 12-yd.), three Caterpillar D7 tractors pulled two LaPant-Choate 12-yd. scrapers and one LeTourneau 8-yd. scraper, one Allis-Chalmers HD-14 two-cycle 110-hp. tractor drew a Gar Wood 12-yd. scoop, and four International TD-18 70-hp. tractors hauled 8-yd. scrapers (three Bucyrus-Eries and one LeTourneau).

Tractor Bulldozers

In all, the contractor had 24 tractor-bulldozers on the job. Three of the Caterpillar D8's pulling 12-yd. scrapers were included in this number, as these units were equipped with either bulldozer or trailbuilder front-end attachments. Seven other Caterpillar tractors, ranging down to 35-hp. size, three Allis-Chalmers HD-14 tractors, and nine International TD-18 tractors were equipped with bulldozers. Principal makes of bulldozers were LaPlant-Choate, Baker, Bucyrus-Erie, Gar Wood and LeTourneau.

As special equipment for clearing and grubbing, two Cletrac tractors were fitted with Sargent bulldozer-overhead shovel attachments carrying contractor-designed buckets for stump pulling. These units proved extremely effective in removing stumps.

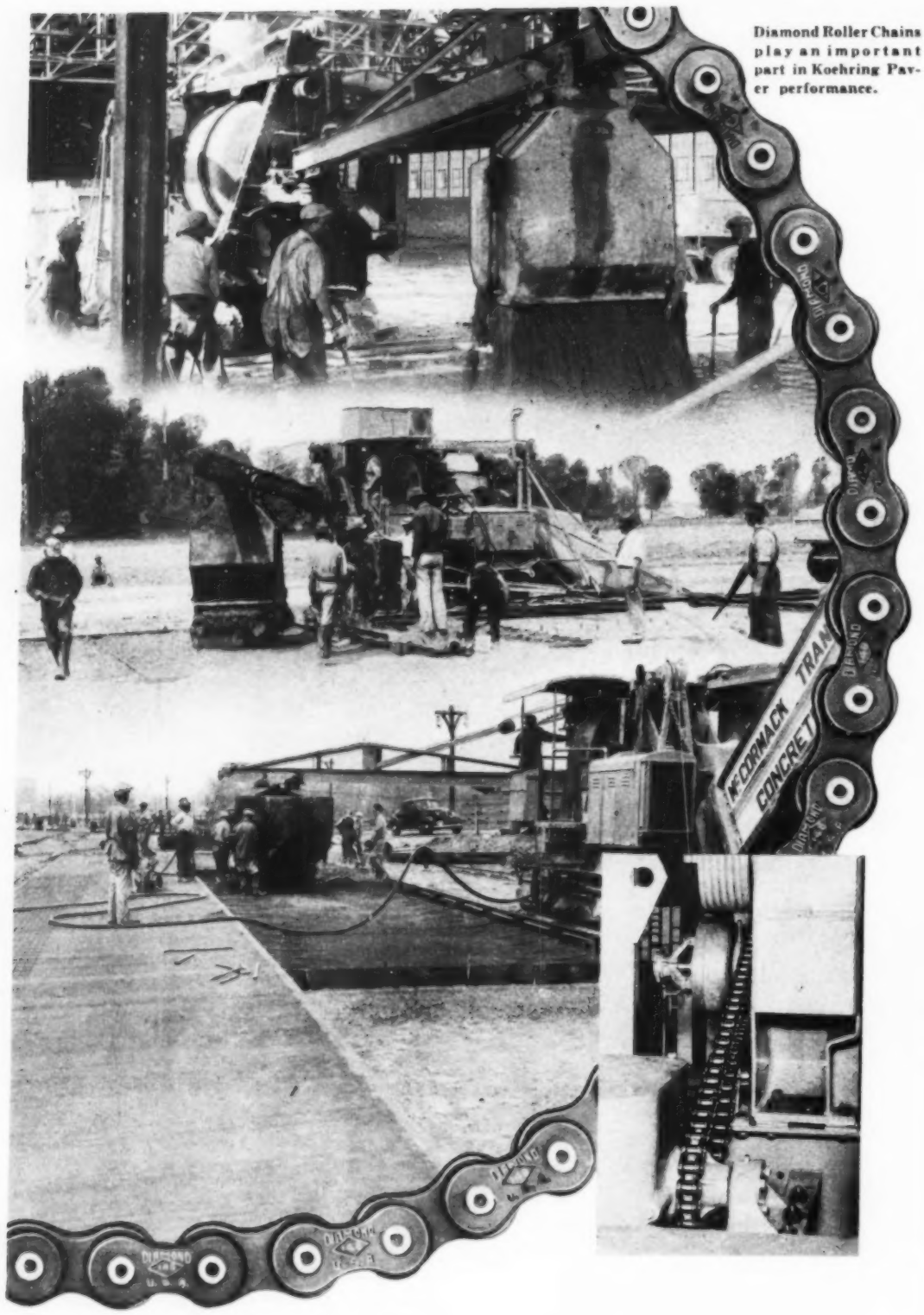
Other equipment included one crawler dragline, one truck crane, six Star No. 50 well drills, four 315-cfm. compressors, four wagon drills, two heavy-duty rippers and three motor graders (Austin-Western and Adams).

Other Contract

On the other contract, where 75 percent of the hauling was done with rubber-tired tractor-wagons, the maximum haul was roughly between 2,200 and 2,400 ft., and the average haul was probably 1,500 to 1,600 ft. The maximum cut was about 87 ft., and the maximum fill about 52 ft.

Shovel excavation was moved by a fleet of 46 Euclid pneumatic-tired haul-

(Continued on page 100)



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DIAMOND ROLLER CHAINS

THE recent awarding of the coveted Maritime "M" burgee and the Victory Fleet flag to our war plants follows through in quick succession on the awards of the Army-Navy "E" and the Treasury Department's Minute Man and Bull's Eye flags.

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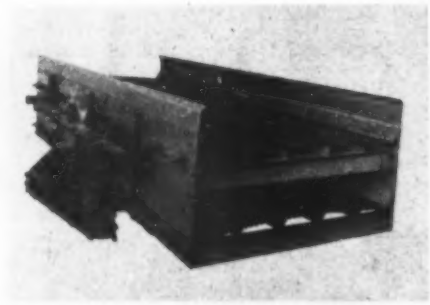
"X-RAY" CATALOG on GYREX SCREENS



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The first few pages of ROBINS new X-Ray Bulletin No. 115 are printed on separate transparent sheets and show the various important parts of the well-known ROBINS-GYREX Vibrating Screen. Together these pages make up a complete screen; but taken separately they permit the reader to study each element of construction and design independently of the rest.

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(Continued from page 98)

ing units, all powered by Cummins diesel engines. This fleet comprised 37 13-yd. bottom-dump tractor-wagons and nine 10-yd. rear-dump trucks.

Thirteen power shovels loaded the rubber-tired hauling units. The shovels included two 3½-yd. Limas, five 2½-yd. Bucyrus-Eries, four 1¾-yd. machines (two Lorains, one Lima, and one Link-Belt), and two 1½-yd. excavators (one Lorain and one Bucyrus-Erie).

About 10,000 cu.yd. of blasted, rooted boulder clay could be moved on this job in a good 24-hr. day by the contractor's fleet of eleven tractor-scrapers. The scrapers were LeTourneau and La-Plant-Choate units of 11- to 17-yd. size, powered mostly by Caterpillar D8 tractors, with one Allis-Chalmers.

Fill material was spread on this job by fourteen bulldozers on Caterpillar D8, D7, and 50-hp. tractors, with a few International TD-18's.

For drilling and other purposes, the contractor had three Chicago Pneumatic 700-cfm. two-stage portable compressors and one Davey 500-cfm. compressor mounted on a tractor. Blast holes were put down by ten Ingersoll-Rand wagon drills, using Timken detachable bits.

Drilling and Blasting

To shake up boulder clay in banks rising to 80 ft. above grade on the one job, the contractor employed six well drills to sink 6-in. blast holes below grade and loaded them with a low-velocity gelatin dynamite (plus black powder in some holes). Holes never were drilled to a depth of less than 20 ft. Various hole spacings from 20 to about 35 ft. were tried, and the latter spacing, both ways between holes, was found best.

In the job's heaviest 96-ft. cut, an 80-ft. bank of boulder clay had to be drilled and blasted after the top 15 to 18 ft. of yellow clay overburden had been removed. The purpose of the blasting was to shake and loosen the indurated clay for loading. Even when shattered by heavy blasting, the material would not slump down to grade to permit level loading by the excavators. The blasted boulder clay always stood perpendicular, and equipment had to climb the bank to take the material off in lifts.

After trying various powder ratios from 1 to 3 up, the contractor found that a ratio of 1 lb. of explosive to 9 cu.yd. gave the best results. The blasters used duPont and American Cyanamid low-velocity 40 percent gelatin dynamite in 25-lb. cartridges 5 in. in diameter, which could be fitted into a 6-in. hole. Some cartridges were opened, and the explosive was poured into the hole and tamped; a better blast was obtained with tamped explosive. Atlas black powder delivered in dampproof bags was used by itself in some holes and mixed with dynamite in other

(Continued on page 102)

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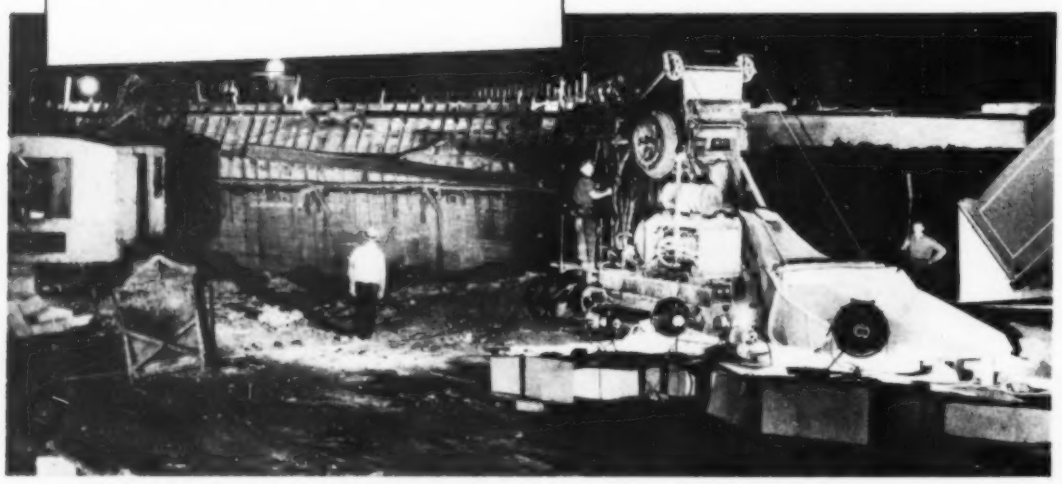
Contractors are working faster than ever, building military projects. And Homelite Portable Generators and Pumps are helping to do the job. While at the same time, Homelite men and women are working harder and faster than ever, turning out the vast number of Homelite units needed for our armed forces.



After the war, when we face our biggest job, the reconstruction, you will have better, more powerful Homelite Pumps and Generators than ever. The pumps will handle more gallons per hour. The generators will produce more power—more power to furnish a wider area of brilliant floodlighting, or for operating a greater number of potent electric tools. For to meet the strict and important demands of military operations under all types of trying conditions, Homelite Products have been greatly improved.

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HOMELITE CORPORATION
PORT CHESTER, NEW YORK

(Continued from page 100)

holes. Black powder could not be placed in the bottom of a wet-drilled well hole because of the water. As the powder was less safe to handle, more time was required in loading holes with this explosive.

After using a little 20 percent gelatin dynamite without any powder, the project manager for the contractor felt that this explosive would have been the best for the job.

Holes were loaded to within 10 ft. of the top. A 70-ft. hole might contain 300 to 400 lb. of explosive. Spacing of explosive charges in a hole depended on the depth of the hole. Electric detonators in the explosive charges were wired at the bottom of the hole and at several points above.

SMALL BUGGY originally used for light plant provides mobile carrier for mechanic's Duplex tool box.

Operations were planned to keep the well drills working all the time, 24 hr. a day. The contractor tried to blast once each day. When the well drills were able to get well ahead of the excavators, one blast might take in as much as 200 ft. back from the face. Ordinarily two rows of holes were fired in one blast. A single blast mentioned by the project manager included 24 holes averaging 47 ft. deep.

Second Blasting Method

On the other job, where the contractor had to cut off a knob 87 ft. high, covered with 10 to 15 ft. of ordinary overburden on top of boulder clay, available wagon drills from a completed contract were brought in to do the drilling. The contractor wanted to tackle the hill at once, and the job manager knew he could get a faster start preparing lifts for the shovels with his own wagon drills than with hired well drills. For the job as a whole, more progress was expected from the wagon drills than from the alternate use of well drills.

Ten wagon drills operated in the boulder clay. One record drilling run gave 80 ft. an hour, but average drill-

(Continued on page 104)

CONCRETE MIXERS by SMITH

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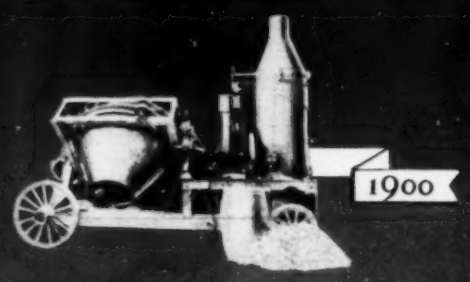

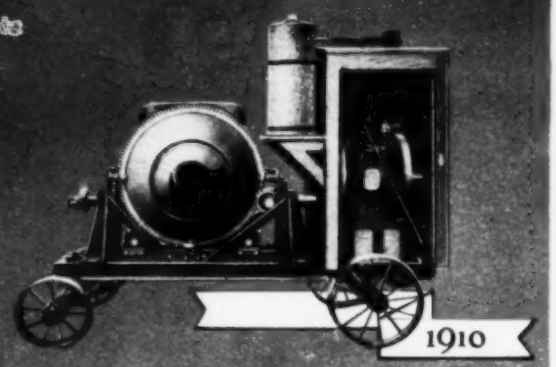

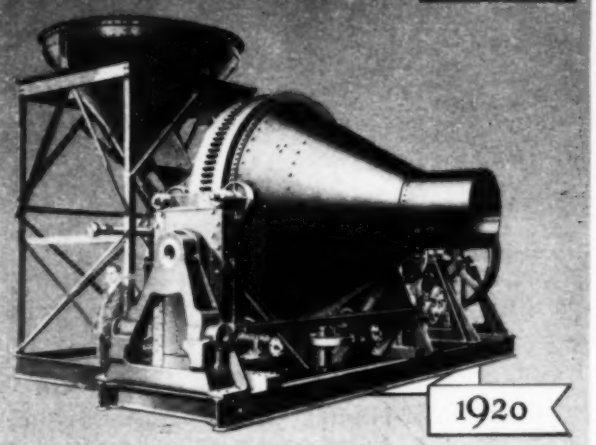

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43 years ago, the late Mr. Thomas L. Smith designed the first duo-cone drum, tilting type, concrete mixer. Judged by today's standards it was a crude machine, nevertheless, the forerunner of the famous Smith line of concrete mixers that has made history in the construction industry. Every year, improvements and refinements were added that resulted in greater convenience, speed and efficiency. Today, Smith is the acknowledged leader in the industry. Smith Mixers have definitely proven their worth, over and over again, on the world's greatest concrete projects: *Boulder Dam, Marshall-Ford Dam, Cherokee Dam, Watts Bar Dam, San Francisco-Oakland Bridge, Norris Dam, Muscle Shoals, Panama Canal* and many other world-famous projects. All sizes available, up to 4-yards per batch.

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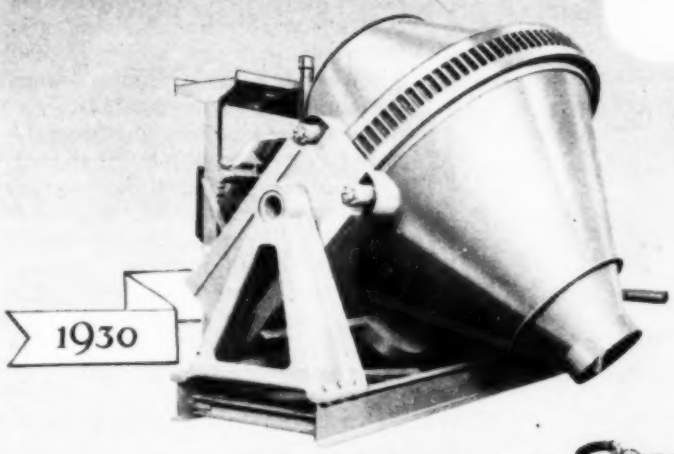

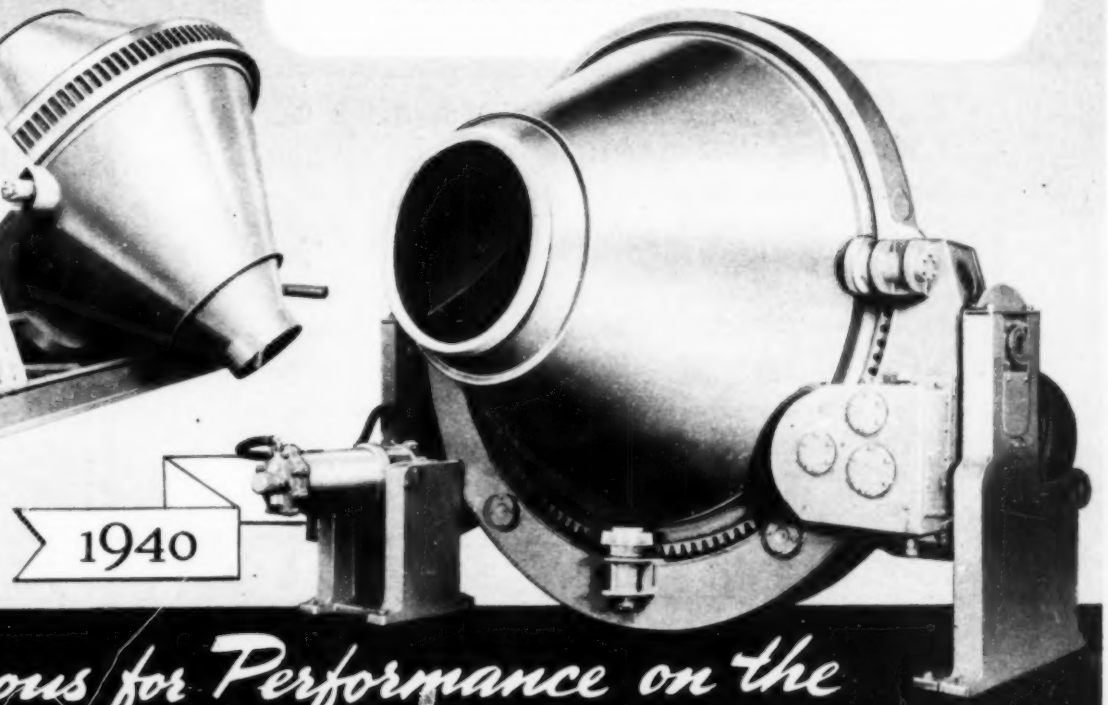

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Williams users report many benefits like the above experiences. They confirm the facts that Williams Buckets are unusually rugged and durable in service and fast in action. It shows too why your next bucket should be a Williams.

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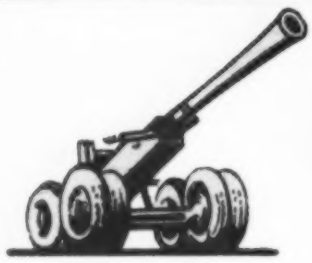

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Jackson VIBRATORS

(Continued from page 102)

ing for the job was about half of that. Holes were drilled 12 ft. deep to shatter 10-ft. lifts and break the bond of the clay on the boulders to permit loading.

To produce the desired loosening and shattering of the boulder clay, the blasters loaded the holes with Hercomite 6A,

DULLED DIPPER TOOTH is cut to shape with gas torch to permit welding on new tip.

a new, slow-burning explosive (the slowest burning in the cartridge type), which proved excellent for this class of material. For filling the bottom of the holes, explosive cartridges (of 2-in. diameter) were untwisted, and the powder was poured. The holes were loaded to no nearer than 6 ft. of the surface and were fired with electric blasting caps. Hercomite 2-in. cartridges were used as primers where the blasters were sure that the cartridges would go into the holes; in doubtful, small-bore holes, smaller 40-percent gelatin dynamite cartridges were used to carry the electric detonators.

Loading with not more than 1/5 lb. of explosive per cu.yd. was sufficient to shatter the boulder clay. Air for the ten wagon drills ordinarily was supplied by the three diesel-powered 700-cfm. portable compressor. The fourth 500-cfm. tractor-mounted compressor was available for drilling, blowing holes and other services.

Working Schedule

With the exception of the well drills, which ran 24 hr. a day, equipment on the one contract worked two 10-hr. shifts per day, seven days a week, with a 1½-hr. rest for maintenance services between shifts. Because of the difficulty of obtaining skilled operators, this contractor felt that better overall production was obtained by using two operators to each machine than by running three 8-hr. shifts.

On the other job, the contractor was

(Continued on page 106)

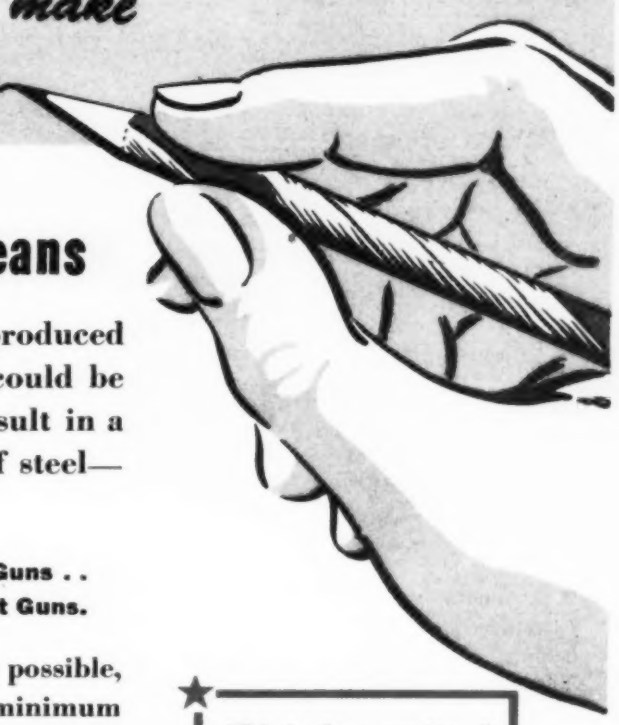
LET'S Do Some Figuring

344,966,000 POUNDS★

5% LONGER LIFE

17,248,300 STEEL SAVED

+ the Man-hours required to make 17,248,300 lbs. of wire rope



NOW...Let's see what that means

344,966,000 pounds of wire rope were produced in 1941. If (by better use and care) its life could be increased a mere five per cent, it would result in a saving of approximately 17,248,300 pounds of steel—which would be sufficient to make:

1,277,652 3″ Shells . . 172,483 50-calibre Machine Guns . . 8,624 4-ton "Block Busters" . . 1,437 3″ Anti-Aircraft Guns.

While ideal working conditions are not always possible, the five per cent saving suggested in our example is a minimum of what might be expected with a little *additional* care. Let us help you get maximum "mileage" out of the wire rope you are now using. A copy of our 44-page illustrated booklet, "Practical Information on the Use and Care of Wire Rope", is yours for the asking, and our experienced Engineering Department is always at your service.

★ This is the quantity of wire rope produced in 1941 *only*. If this longer life—a mere five per cent—could be obtained from all wire rope now in use, the steel saving would be much greater.

A. LESCHEN & SONS ROPE CO.

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The new *Page* TWO-ENGINE Dragline eliminates this time loss by having one engine for Loading and Hoisting AND ANOTHER SEPARATE ENGINE FOR SWINGING! Each engine working independently of the other.

By using two powerful, compact *Page* HORIZONTAL Diesel Engines — one above the other — the *Page* TWO-ENGINE Dragline saves precious seconds on every pass. MOVES MORE DIRT PER SHIFT. It's the "diggin'est dragline you ever saw."

★ ★ ★

Today *Page* draglines are only available for work contributing to the war effort, but after "V-Day," we'll have a *Page* TWO-ENGINE dragline for everyone who wants to MOVE DIRT *FASTER.*

★ PAGE ENGINEERING CO.
★ Chicago, Illinois

PAGE
Two-Engine
DRAGLINES

(Continued from page 104)

able to employ a sufficient number of operators to permit a three-shift schedule, and this job operated three 8-hr. shifts per day seven days a week.

Equipment Maintenance

Both contractors faced a serious problem of equipment maintenance, and both were fortunate in having A-1 master mechanics to take charge of their job shops. Accompanying photographs illustrate some of the tools and equipment used in the maintenance and repair shops.

NEW CUTTING EDGE is electrically welded on dipper tooth with manganese steel electrode. After this weld has been completed, new tip is hard-surfaced with special alloy steel electrode.

In addition to the shops, both jobs were equipped with Graco truck-mounted convoy lubers for lubricating equipment in the field and with maintenance trucks carrying welding and cutting outfits. Steam-cleaning machines were available to remove dirt and grease from equipment units when they were brought into the shop.

Lighting System

Both jobs utilized commercial power in varying degree for night lighting. On the one job, the contractor installed pole lines and transformers to carry electric power to floodlights on towers and poles at a cost only about one-third as much as had been paid for portable truck-mounted plants and towers rented under subcontract on another job.

On the other job, the contractor used

(Continued on page 108)

When "*TIME is of the essence*" use VACUUM

★ U. S. Navy Official photo

Today, that old-fashioned phrase—"time is of the essence"—takes on new significance and appears in most contracts for War construction.

To SAVE TIME—and gain other advantages—the Vacuum Concrete process is used by engineers and contractors who know its value—for these ends:

To gain strength quickly and expedite form removal—28-day strength in three days.

To minimize the risk of freezing concrete in cold weather.

To gain high compressive strength, without any change in the ratio of aggregates.

To speed the finishing work—finishers follow up the concrete-placing gang quickly—right behind the vacuum processing.

See how this last point is clearly illustrated in the above photograph: an official U. S. Navy Department photo, on an unnamable job in a censored location. This shows convincingly how wet concrete quickly and thoroughly dewaters to workable finishing condition at once. The finishing gang is right behind the vacuum mats.

Look into the VACUUM PROCESS for your Post-War work. Get the details now, to have them at your command. Meantime despite the demand for our equipment, if we can help you overcome a winter concrete problem on your war job, you can count on us to do our best!

The VACUUM PROCESS has been used on eighteen million square feet of concrete on *twenty-one U. S. Navy projects.

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Here is a compact, handy manual by two well-known engineering writers, that meets all needs for quick review of, or reference to the most important elements of designing simple structures — of special value to those preparing for license or registration exams.

Elementary Structural Engineering

By LEONARD C. URQUHART and CHARLES E. O'ROURKE

Professors of Structural Engineering
Cornell University

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THIS book covers the fundamental principles of structural theory and design in steel, timber, and concrete, together with a discussion of the essential fundamental principles of mechanics and properties of structural materials.

A concise explanation of the basic principles of structural mechanics has been included, to lead toward a deeper understanding of the subsequent design theories and methods.

Various methods of computing deflections of beams and trusses are outlined in another chapter, together with applications of these methods to typical practical problems.

The remaining chapters explain and apply the theories involved in the design of the various structural elements, such as homogeneous beams of timber and steel, plate girders, reinforced concrete beams, tension and compression members in steel and timber trusses, columns of timber, steel, and reinforced concrete, members subjected to bending and axial stresses, and footings.

See what the book gives you:

—helpful groundwork in the principles of structural mechanics

—useful thumb-nail review of materials; characteristics, properties, fabrication, working stresses, etc.

—chapter of classification and requirements of loads for various types of structures

—methods of computing deflections of beams and trusses

—elements applying to the design of connections and splices.

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(Books sent on approval in U. S. and Canada only.)

(Continued from page 106)

commercial power for three tall lighting towers, two 85 ft. high and one 65 ft. high, each carrying about fourteen Westinghouse and G-E 1,500-w. floodlights. Additional lighting was provided by nine or ten portable towers equipped with 6-kw. light plants.

Contractor's Cost System

In common with all other jobs constructed by one of the contractors in the last two years, the airport grading job of this firm kept complete daily unit costs and supplied the record for each day (both the daily and cumulative unit costs for each work item) to the home office on the following day. Keeping such unit costs requires a large office staff, but the system has its value, especially in these days when contractors are working on war contracts (competitive-bid, negotiated or fixed-fee) under a restricted profit limit. A profit-sharing plan installed by this contractor three years ago to embrace all permanent employees, including equipment operators, has been accepted by the government as a permissible feature of the contractor's financial system under war contracts.

★ ★ ★

How Britain Repairs *Bombed Buildings*

(Continued from page 48)

bined in many cases to have a surplus of housing accommodation. It has, therefore, at any rate, until recently, been possible to concentrate on the repairs of residential property which can be rendered fit for occupation at comparatively moderate cost.

Houses have been dealt with more or less in this order:

(1) Temporary repairs to those less seriously damaged and capable of being made fit for occupation (particularly where still occupied).

(2) Demolition of properties dangerous to the public or likely to become a public nuisance if left standing.

(3) Sufficient work to preserve those houses not readily repairable but not meriting demolition.

(4) Further repairs to houses in Class 1 as labor and more suitable materials become available.

For example, the first step for houses in category (1) would be to fill in the windows (first roughly repairing the

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NEW CASTLE, INDIANA
Plants: New Castle, Ind.; Chicago, Ill.; Kalamazoo, Mich.

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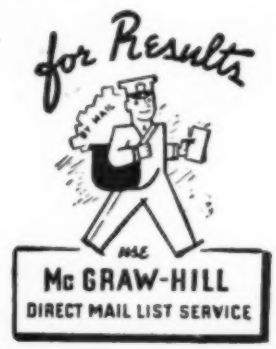

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330 West 42nd St., New York, N. Y.

broken sashes and frames) to keep out the weather. The material immediately to hand has usually been some form of wallboard, although at a later stage efforts are made to give every house 50 percent of glass or glass substitute.

Buildings required for the maintenance of public services share priority with dwelling houses, but shops and offices come lower in the scale. Here again business evacuation and the closing down of firms as a result of the war has left in many places a surplus of accommodation. Occupiers who desire to remain in their damaged properties have usually found it possible to get temporary patching done reasonably quickly, notwithstanding the fact that after a serious raid all building firms in and around the area have been practically commandeered for the repair of houses under the direction of the local council.

Building Industry Organized

The organization of the building industry covers employers, labor, and supplies. In case of need there is power virtually to conscript building firms in any area into the service of the local authority, although this is rarely resorted to except immediately after a heavy raid when ordinary methods would leave thousands of people inadequately housed. Labor in the building industry is also tied; a man cannot be employed except through the Employment Exchange, and the Exchange can send any man reporting for work to wherever his services are required. Thus, the employers' business organizations are available and surplus labor in any area can be directed to where it is urgently needed.

Most repair work, whether public or private, is carried out on the basis of cost of labor and materials plus agreed percentages. As regards materials, local authorities had before September, 1939, begun to lay in stocks for repairing buildings, but it is difficult for any one authority to hold sufficient stocks to deal with a really heavy raid in its district. Indeed, it is not unlikely that in some cases the stocks themselves have been lost in the raid, and there must be large, well dispersed stocks held by a central department, as well as cooperation between local authorities.

Even then it has often been necessary for local authorities to call upon builders to use their own stocks, though this is avoided if possible, in view of the difficulty, and often impossibility, of getting replacements. Many materials in short supply are obtainable only under license. For example, it is more than a year since the last heavy raids on London, but builders are only now able to replace their stocks of slates.

Building Squads

The latest development has been the provision by the government of mobile building squads in units of 60 men,

(Continued on page 110)

Saw Faster...
Build Quicker
FINISH WAR-JOBS SOONER
WITH
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EVERY MAN
COUNTS FOR MORE
USING SKILSAW TOOLS!
SKILSAW
• SKILSAW speeds every sawing cut in all materials. Trims off roof-sheathing and floor-decking after lumber is nailed in place for extra time savings.

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Men take a keen delight in operating Sterling Wheelbarrows because of their well-balanced, able-to-take-it construction and easy wheeling qualities. Veterans of long years of service, Sterlings are invariably the preferred method of material transport — for both war-time and peace-time production.

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A MOUTHFUL AT EVERY BITE

(Continued from page 109)

with transport and materials, ready to move at short notice to any area where assistance is required. So far as the methods of repair are concerned, there is little that can be said. If the importance of a building to the war effort necessitates complete repair, the task is very much in the nature of an ordinary building operation. If it is a matter for temporary repairs, then the operation is dictated largely by the materials in hand or released for the work. There is, however, some scope for originality and ingenuity in this.

For instance, the usual practice in repairing a shop front is to replace only a small proportion of the glass as a display opening in the wallboard or other material used for filling in the open front. Many of these temporary fronts have been most attractively designed and decorated. Again, where part of a block of apartments has been damaged, it has sometimes proved possible to erect a temporary wall in such a position as to preserve some of the accommodation in the damaged part in the form of smaller apartments with one or two rooms less.

In other cases a damaged upper part of a building has been removed, and by asphalting the highest floor in sound condition, the building has been kept in service although reduced in height. As an alternative, if the upper part is too seriously damaged for complete immediate repair but does not warrant removal, it may be made watertight with roofing felt or by other means so that perhaps only the top story of the building is out of commission.

Legislation for Temporary Repairs

The bulk of the work being done today to repair war damage is probably temporary, and this is recognized in current legislation. Under the War Damage Act of 1941, which provides for the payment of compensation for war damage to property, provision is made for what is known as a "temporary works payment," this being "the proper cost of any works reasonably executed for temporarily meeting the circumstances created by the damage." The cost of renewing these temporary works from time to time is also admitted as a ground for claim.

Temporary repairs were also foreseen in the Landlord and Tenant (War Damage) Act of 1939, under which a tenant can, in certain circumstances, avoid payment of rent, that is, if the buildings are "unfit" for the purpose for which they were used, due regard being had to the condition of other similar buildings in the locality. The landlord is given power to enter to carry out permanent or temporary repairs. Rent becomes payable again when the premises have been rendered "fit," which usually involves the execution of such temporary repairs as may be necessary to enable the former use of the buildings to be revived.

In areas where devastation is exten-

(Continued on page 112)

How to choose and use WIRE ROPE SHEAVES

1. Check groove diameter—Make sure that the sheave groove is large enough so that it doesn't pinch the rope. The rope must seat freely down into the bottom of the groove. If it rides the sides of the groove, pinching and abrasion will result. For best results, observe the tolerances listed in the following table:

Nominal wire rope diameter	*Minimum groove tolerance*	*Maximum groove tolerance*
0 to $\frac{3}{4}$"	+ $\frac{1}{32}$"	+ $\frac{1}{16}$"
$\frac{13}{16}$ to $1\frac{1}{8}$"	+ $\frac{3}{64}$"	+ $\frac{3}{32}$"
$1\frac{3}{16}$ to $1\frac{1}{2}$"	+ $\frac{1}{16}$"	+ $\frac{1}{8}$"
$1\frac{9}{16}$ to $2\frac{1}{4}$"	+ $\frac{3}{32}$"	+ $\frac{3}{16}$"
$2\frac{5}{16}$" and larger	+ $\frac{1}{8}$"	+ $\frac{1}{4}$"

2. Check sheave diameter—The larger the sheave, the longer your wire rope will last. When a rope pulls sharply around a small-diameter sheave, it is subjected to severe bending and crushing. This tends to make the rope "go out of round," causes wear on outside wires, and stresses the various parts of the rope unequally.

Whenever there is a choice between a small sheave and larger one—the larger diameter sheave will help the rope to last longer.

3. Keep grooves and flanges smooth—After a sheave has been handling heavy loads for some time, the imprint of the rope lay is apt to be worn into the groove of the sheave. A wire rope, working over this sharp-edged imprint, is subject to abrasion and loss of operating efficiency.

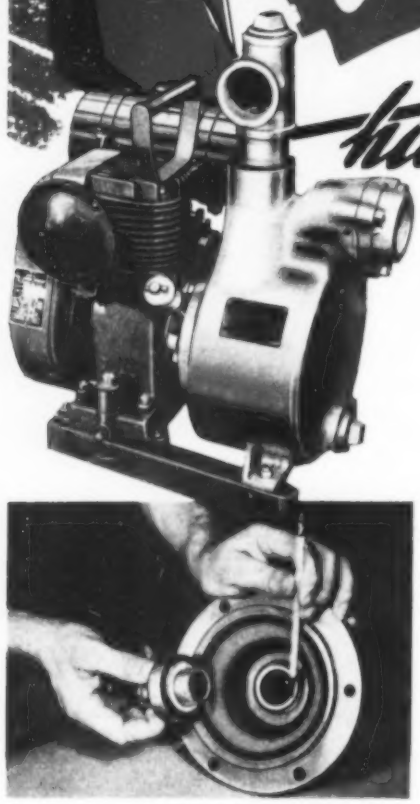
The best way to prevent sheave grooves from wearing prematurely is to select a sheave made of manganese steel. However, if you cannot get special sheave steel, the next best thing is to take care of the sheaves you do have. If evidence of wear develops, smooth up the grooves immediately in accordance with groove tolerances which appear in the foregoing table.

Bethlehem manufactures wire rope for all purposes

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

CARVER Certified PUMPS have a Lifetime Seal



ABOVE: Here's the vital heart of sustained high performance — the seal that keeps air out and water in. Fast priming and high efficiency suffer with the slightest leak — that's why Carver builds a *Lifetime* Seal for long-lasting performance!

BELOW: Wearing surfaces on the Carver Lifetime Seal are Tungsten Carbide — so hard it cuts glass!

CARVER PUMPS are making enviable records on thousands of tough pumping jobs today because their performance *stays* high. The answer lies in Carver's *Lifetime* Seal — a correctly engineered seal with wearing surfaces of tungsten carbide, the hardest, longest-wearing material available!

If *your* job calls for a pump that will stand the gaff of thousands of hours pumping dirty, muddy or sandy water and still retain its original lightning-fast prime, its original high efficiency, a Carver is the *only* pump for you!

Write or wire today for complete information — the Carver line includes capacities from 5,000 to 125,000 GPM in gas engine, electric motor or belt-driven models.

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CARVER CENTRIFUGAL Certified PUMPS

(Continued from page 110)

sive it is desirable that powers should exist to control the extent of repairs carried out, having regard to possible future schemes of town improvement, and provision for this exists in the War Damage Act of 1941.

The repair of war damage has involved preparation in many spheres: The Legislature has prepared the law; the responsible central and local authorities have been given special powers and have made preparations to use them; labor needs have been kept in view when other national demands on man-power were being considered; supplies of building materials, and in particular those best suited for quick work by partially skilled labor, were reviewed; the need for transport was carefully considered, and schemes for cooperation and mobile units covering fairly extensive areas were worked out. The way in which the scheme has worked so far has proved both the necessity and the efficiency of this organization.

★ ★ ★

Army "Shipyard"

Builds Wood Pontons

For Floating Bridges

(Continued from page 47)

receive through-bolts was done with air-powered augers. Both air-operated impact wrenches and hand-operated ratchet wrenches were used to run up the nuts on the bolts. With operations at their peak the contractor's force numbered 200 men, divided into groups and assigned to specialized tasks of prefabrication and assembly. The crew completed four pontons every three days.

Typical of the floating bridges for which the shipyard produced the necessary pontons is the recently completed Potomac River crossing at the foot of 14th St., linking the District of Columbia with Virginia. It comprises 2,031 ft. of trestles and ramps, 640 ft. of pontons, 709 ft. of approach roads and a fixed steel span providing an opening 50 ft. wide and 21 ft. high on the Virginia side to permit the passage of boats. The pontons required for this crossing numbered 30, spaced 23 ft. apart on centers. They are held in place, both upstream and downstream, by ⅝-in. wire rope cables to 7½-ton anchors of concrete. The new bridge carries a two-lane roadway capable of handling normally a 15-ton truck, or a 20-ton truck if operated

at slow speed. The bridge floor is of asphalt-treated wood planks. At the trestle terminals of the crossing are ramp spans, 55 ft. long, hinged to provide for the movement of the tide.

The bridges were designed in the Baltimore District Engineer Office and their construction was supervised by Major Donald A. Phelan, Washington District Engineer. The J. E. Greiner Co., of Baltimore, served as architect-engineer for field inspection only. The contractor was the Frederick Snare Corp., of New York.

★ ★ ★

Preventive Maintenance Will Keep America's *Trucks Rolling*

(Continued from page 66)

truck operation, maintenance and repair, the accompanying photographs from the Office of Defense Transportation illustrate what happens in specific cases when trucks are neglected. Thorough inspection at regular intervals will prevent these abuses. A proper preventive maintenance system is based on an inspection every 1,000 miles or every 30 days, whichever occurs first.

By observing a few simple rules truck operators can add thousands of miles to the life of every tire. Speed is the greatest enemy of tire mileage. For maximum tire life no truck should ever be operated in excess of 40 mph. Lower speeds are preferable.

Overloading Ruins Tires

Next to excessive speed nothing ruins a tire faster than loading it beyond the limits for which it was designed. An overloaded tire generates terrific internal heat which quickly weakens the tire body, causing rapid and uneven tread wear. Don't try to compensate for overloading by increasing the air pressure beyond the recommended inflation level. Underinflation has much the same effect as overloading. Check your tires frequently.

When dual tires are mismated the larger tire carries most of the load, resulting in rapid tread wear. Tires that differ in diameter by more than ¼-in. should not be mounted on the same set of dual wheels. The outer wheel should always get the newer tire, to compensate for the crown of the road.

Faulty wheel alignment causes tire

Continued on page 114)

LeTourneau Equipment Helps Make Alcan Highway Fast Construction Triumph

BOTH ENDS TO MIDDLE – Here U. S. Engineers, using LeTourneau Model LP Carryalls (15 heaped yards) with "Caterpillar" tractors, move dirt from cuts at each end of the haul to a fill in the middle, thus eliminate two turns each round trip and increase both number of loads and hourly yardage. Usually, as in this spot, working both ways gives you the advantage of downhill loading, too.

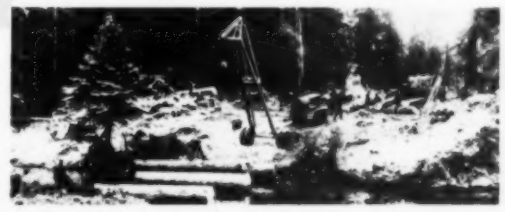
Hundreds of LeTourneau units helped the U.S. Engineers and private contractors push the Alcan Highway through ice, snow, mud, muskeg and thick forests, to completion in less than one year. LeTourneau equipment, we believe, was chosen for many of the toughest jobs because:

1. Tractors equipped with LeTourneau Power Control Units are never tied down to one piece of equipment. They operate any LeTourneau rig – Dozer, Carryall Scraper, Rooter, Crane or Tournatrailer. Changes frpm one rig to another are easily and quickly made.

2. LeTourneau Power Control Units give you sure-acting, trigger-quick operation regardless of weather temperatures. With LeTourneau cable control, there's no oil to thicken in subzero weather or to thin in broiling heat.

3. Reserve strength – the result of stout-welded construction and oversize parts, such as axles and bearings – enables LeTourneau equipment to handle big yardages under punishing conditions. When repairs do become necessary, they often can be made in the field with a portable welding outfit. Many parts are interchangeable, thus requiring smaller parts stocks.

Pictures here show a few ways in which LeTourneau units speeded Alcan highway construction. What they did there, they can do on your tough jobs. Ask your LeTourneau-"Caterpillar" dealer for details.



CRANE HANDYMAN – LeTourneau Crane makes it easy for resourceful Army engineers to bridge icy stream with timber cut on the spot. LeTourneau Cranes go anywhere a tractor can travel, are easily maneuvered, simple to operate.

SHAVING STUBBLE OFF THE EDGES – (Above) Here LeTourneau Angledozer completes a clearing job by removing trees, rocks and brush along the highway edge, to give Carryall operators a fully cleared working width. Note that most tractors on this job are fitted with both front-end and double-drum, rear-mounted Power Control Units, thus can keep a Dozer mounted for instant use while operating a Carryall, Crane or Rooter.

FAST TRAVEL BETWEEN JOBS – (Right) Truck-hauling speeds (up to 14.3 m.p.h.) and extra-large-diameter tires enable Tournapulls to negotiate soft spots with ease or to travel on concrete. This one is speeding from a completed assignment to another job on the Alaskan Highway under its own power – no hauling equipment tied up moving it.

LETOURNEAU

PEORIA, ILLINOIS • STOCKTON, CALIFORNIA

HEAVY CONSTRUCTION EQUIPMENT

You Can't Have Too Many Simplex Jacks!

Don't get caught short! Uses for Simplex Jacks on any construction job are practically limitless. You can't list the needs, for a new one is continually popping up—an operation you couldn't possibly perform without plenty of powerful, rugged, easily-operated jacks; and that means Simplex Jacks. Lifting, lowering, pushing, moving, supporting—they help you get the toughest jobs done quickly—safely—efficiently.

Three types—Lever, Screw and Hydraulic—available in a wide range of styles and capacities. Whatever the requirement, there's a Simplex Jack to do it.

Simplex Screw Jacks have tough malleable bases — self-leveling cap with 9° float — single large chrome-moly steel ball that reduces friction 88% — safety peep-hole prevents over-extension. 38 sizes with 4-way head; 19 sizes with ratchet head.

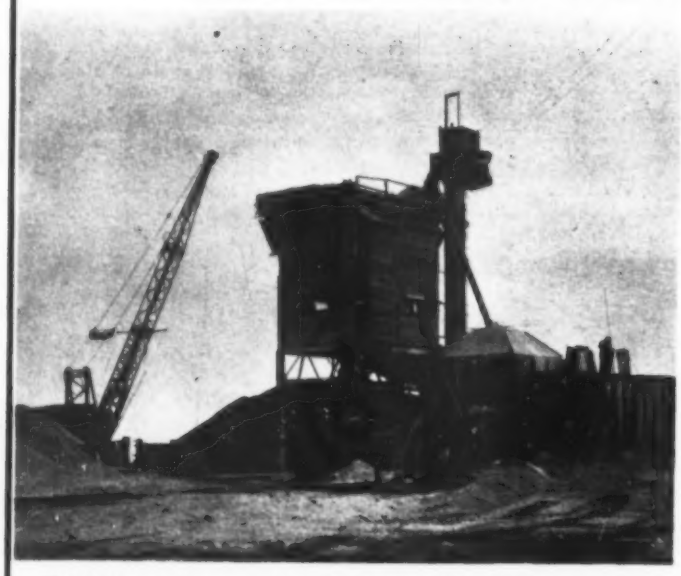
Simplex Hydraulic Jacks feature safer pressure-toned malleable iron base and top nut —release valve shielded against breakage — Neoprene non-deteriorating packing seals. 3—20 tons capacity.

Simplex Lever Jacks have Gold Medal Award for Safety Mechanism. Every one is guaranteed to lift full capacity on cap or toe lift. Unbreakable trunnions—no fulcrum pins. Expansion rivets—no machine screws to come loose. 5 to 20 ton capacity. (Geared jacks to 35 tons, Journal jacks to 50 tons.)

Templeton, Kenly & Co.
CHICAGO, ILL.
Better, Safer Construction Jacks Since 1899

Simplex
LEVER SCREW HYDRAULIC
Jacks

WHEN YOU DO IT WITH READY-MIXED, YOU CAN DO IT FASTER WITH A BUTLER PLANT



This highly portable set-up consists of an 85 cu. yd. bin with three compartments for aggregate and one for cement, and a 70 cu. yd. ground cement storage bin. Very high production was achieved at an eastern Naval Base.

Speed in construction has always been important, but never as important as it is today. That is why many large contractors are using ready-mixed concrete to simplify their pouring problems; and that is why most of them turn to Butler for their plants. Butler plants have reached the unprecedented speed of 250 cubic yards of concrete per hour, for each is *engineered* to do its particular job.

Consult Butler about your plant problems; the best always costs less in the end.

BUTLER BIN COMPANY
WAUKESHA WISCONSIN

(Continued from page 113)

"cupping," a form of excessive tread wear. Brakes out of adjustment or drums out of round cause excessive and spotty tire wear, while rims with bent or damaged flanges do not permit the tire to seat itself properly, resulting in chafing and early failure in bead area.

Do your part to keep America's trucks rolling.

★ ★ ★

Vacuum Mats and Power Machines

Speed Concrete Floor Finish

(Continued from page 68)

blocks is required. Low cement content of the mix and removal of excess mixing water reduce concrete shrinkage, and this fact permits wide spacing between expansion joints, with consequent reduction in the number of joints to be finished during construction and maintained later when the floors have to take the pounding of warehouse trucks.

Effect of Processing Concrete

For concrete with a minimum compressive strength of 2,500 lb. at 28 days, the mix is designed with 4.3 sacks of cement per cubic yard. Total water content, including moisture in the aggregate, is about 10 gal. per sack, or 42.2 gal. per cubic yard. During the 10 min. of processing under the vacuum mats, the concrete in the slab gives up its excess water, 14 gal. per cubic yard, and the floor is compressed and dried sufficiently to permit the power floats to be operated immediately on the surface. Effective water remaining in the concrete is 28.2 gal. per yard, and the water-cement ratio is 6.55. Compression tests are consistently above 3,000 lb. per square inch at 28 days.

Floor Construction—Columns inside the building are arranged in transverse rows spaced 20 ft., c.to c. Floor slab is laid in successive 20-ft. lanes running crosswise of the building between these rows of columns. Truck-mixers back in between the screed boards to deposit floor concrete directly on the earth subgrade, where it is spread with hand shovels. A roller screed strikes off the concrete at a great saving in labor as compared with the ordinary method of using a vertical, flat-surfaced screed. Two finishers operate the roller screed, which is a 22-ft. length of 5-in. pipe

(Continued on page 116)

Yes, and IN UNIFORM

Since 1846, Hazard wire ropes have been famous for their uniformity—foot by foot, reel by reel. Uniform dependability is one of the big reasons why we have customers coming back for Hazard ropes, *continuously*, for 30, 40 and 50 years.

Today Hazard lines are not only uniform in quality but they are *in the uniform* of war work. They are being used for mine sweepers, torpedo nets, tethers for observation balloons, balloon barrage ropes, airplane controls, ship rigging, hoist ropes for lifting aerial bombs into place in bombers, winch ropes for Army motor trucks and tractors, ropes for airplanes and artillery, glider tows, parachute flares, parachute rip cords, firing controls on tanks and heavy gun mounts, shipyard crane ropes, etc., etc. Much of this rope is **HAZARD LAY-SET** Preformed Green Strand—the rope that lasts longer because it is free from internal stress. It is also easier and safer to handle, resists kinking, whipping or rotating in sheave grooves. Some of the rope is **HAZARD "NONPAREIL"**—the rope that represents 96 years of wire rope-making experience, known to "old timers" as well as the younger operators as the line that gets the job done efficiently and economically.

HAZARD WIRE ROPE DIVISION Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Fort Worth, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Tacoma

AMERICAN CHAIN & CABLE COMPANY, INC., BRIDGEPORT, CONNECTICUT

HAZARD LAY-SET Preformed WIRE ROPE

DAVEY

Split Propeller POWER TAKE-OFF

IDEAL FOR WAR WORK...

Eliminates Accessory Engine—Saves Weight

This sturdy power take-off was designed to stand the heavy pulsating load of an air compressor. By years of satisfactory operation of compressors this take-off has proved a superior means of transmitting truck power to other units such as generators, winches, welders or combinations of these units. A dependable unit for portable operation it is particularly suited to War Work.

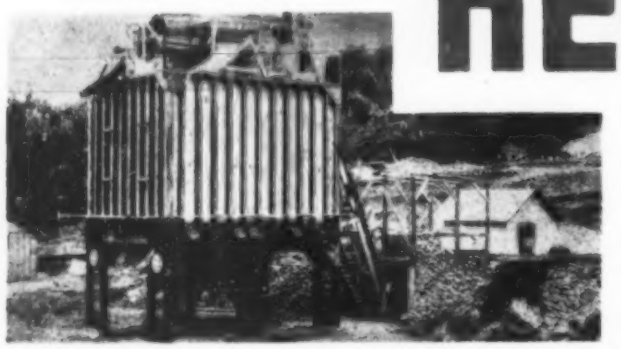
DAVEY ALSO BUILDS

a full line of heavy duty portable and industrial compressors in addition to compressors for mounting on tractors and trucks. Write for Bulletins on Power Take-Off and Compressors.

DAVEY COMPRESSOR CO.

KENT • OHIO • U.S.A.

Either way - make it a Reliance

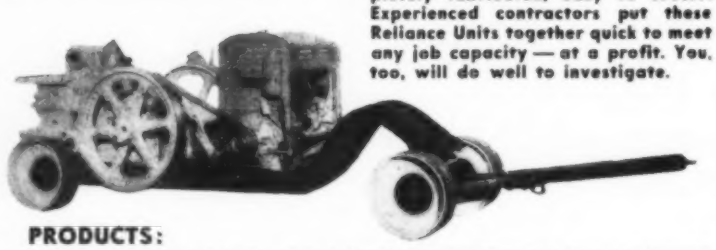


CRUSHING PLANT

A complete unit—rapidly set up, inexpensive to operate, insuring large capacity, very little vibration. Crushing, elevating, washing, screening done on spot, materials stored in Reliance Steel or Wood Bins (completely fabricated, easy to erect). Experienced contractors put these Reliance Units together quick to meet any job capacity — at a profit. You, too, will do well to investigate.

PORTABLE with V-BELT DRIVE

Whether you use this Reliance Portable Crusher alone or in combination with an Elevator, Chute Screen, etc., you can get no better value for your money in terms of capacity, low operating cost and rugged durability. The Reliance Crusher is famous for its strength and simplicity. It is particularly stable. A "swell" buy for crushing on any job. Send for detailed circular.



PRODUCTS:

Reliance offers a complete line of Rock Crushers; Bucket Elevators; Revolving Screens; Storage Bins; Pulverizers; Chip Spreaders; Heating Kettles; Bin Gates; Feeders; Belt Conveyors; Grizzlies; Air Separators; Sand and Gravel Spreaders; Wash Boxes.

UNIVERSAL ROAD MACHINERY COMPANY

KINGSTON, N. Y., U. S. A.

DISTRIBUTORS in ALL PRINCIPAL CITIES of U. S. A.

(Continued from page 114)

riding on the screed boards. Rod handles are mounted on axle hubs at the two ends of the pipe to permit the tubular screed to be rolled along the screed boards by either pulling or pushing.

Within a few minutes after the screed boards have been pulled and the resulting grooves filled with freshly tamped concrete struck off to grade, the vacuum mats are moved ahead and laid in position on the surface of the slab. Vacuum mats are the standard 3x4-ft. size with plywood backing supplied for floor processing by Vacuum Concrete, Inc., Philadelphia. A raised edge and a gasket rubber flap around the bottom of the panel make a tight seal with the wet concrete, and a fabric screen covering the lower face of the mat prevents removal of cement along with the water. Each mat is fitted with a valve-controlled outlet pipe for hose connection to a manifold of the vacuum system, as indicated in accompanying photograph. The manifolds, made of lightweight 2-in. seamless steel tubing 20 ft. long with 20 nipples to take care of hoses from the vacuum mats, are connected by reinforced vacuum hose to the vacuum pump.

On the Scotia job, each of the truck-mounted pumps, driven by power take-off from the truck transmission, has connections for three hose lines from the manifolds. The pump is a Fuller rotary unit with a capacity of 840 cfm. at 20-in. vacuum. Water drawn off from the concrete through the hose lines is trapped into 50-gal. drums alongside the truck-mounted pump. The drums are so hooked up to the vacuum system that the flow of air and water can be switched without interruption to an empty tank whenever a filled drum has to be disconnected.

Power Finishers

As soon as the vacuum mats have completed their 10-min. processing and have moved ahead, the concrete slab is ready to receive its initial surface finish, imparted by Kelley gasoline-powered rotary floats. These machines are followed by Whiteman gasoline-driven rotary trowels, which give the floor its first troweling. The two machine operations produce a good surface finish with an excellent mortar coat for hard troweling by the hand finishers. The complete series of steps, from vacuum processing to troweling, results in a dense slab with a hard monolithic finish. To cure the concrete, an impervious membrane of transparent liquid sealing compound, containing a colored dye which fades out in a few hours, is sprayed on the surface.

For the Bureau of Yards and Docks of the Navy Department, Comdr. W. W. Schneider (CEC) USN, is officer in charge of construction. Daniel B. Niederlander, project manager, and Edward P. Palmer, assistant project manager, are in charge of the work for the contractors, the John W. Cowper Co., Inc., and Senior & Palmer, Inc.

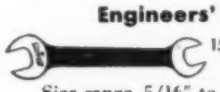
HOW AND WHY
WILLIAMS' TOOLS AID WAR PRODUCTION

J. H. WILLIAMS & CO., *Drop-Forgings and Drop-Forged Tools*, BUFFALO, N. Y.

DATA ON WILLIAMS' "SUPERIOR" WRENCHES

● Since Williams' "Superior" (Carbon Steel) Wrenches provide exceptional strength with minimum use of critical materials, a review of standard available types is timely. "Superior" Wrenches are approximately twice as strong as earlier carbon steel wrenches of our manufacture. Comparative tests demonstrate that they average (throughout all patterns and sizes) 93% as strong as our corresponding alloy steel "Superrenches", which we feel are among the strongest wrenches ever manufactured commercially.

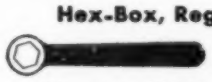
A description of the most generally used "Superior" wrench types follows. More detailed information is contained in Williams' Wrench Booklet, No. A-31, which will be mailed for the asking.

Engineers' Pattern

15° Angle, Double Head. For general service.

Size range, 5/16" to 5-3/8" openings.
Also single head style, 3/16" to 7-5/8".

Check Nut or "Thin" Pattern
15° Angle, Double Head. For Check, Jam or Lock Nuts, etc.

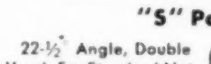
Size range, 13/32" to 1-1/2" openings.
Also single head style, 7/16" to 1-11/16".

Hex-Box, Regular Pattern

15° Angle, Single Head. For general service.

Size range, 13/32" to 4-5/8" opening.
Larger sizes, from 3-3/8" to 4-5/8" opening, are also furnished with *striking face* on end of shorter handle.

Hex-Box, Heavy Pattern
15° Angle, Single Head. For heavy duty.

Size range, 1-1/4" to 3-1/8" opening.
Also made with *striking face* on end of shorter handle throughout full size range.

Set Screw Pattern

22-1/2° Angle, Double Head. For Set Screws, Square Cap Screws & Nuts.

Size range, 3/16" to 1-1/8" opening.
Also single head style, 3/16" to 1-1/8".

"S" Pattern
22-½° Angle, Double Head. For Standard Nuts and Cap Screws.

Size range, 5/16" to 2" opening.

Machine Pattern

Straight Opening. Dbl. Hd. Extra heavy for Planers, Milling Machines, Lathes, Drill Presses, etc.

Size range, 3/8" to 1-7/16" opening.

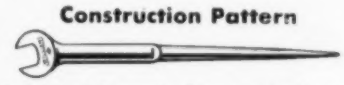
Tool Post Pattern
For Set Screws only.

For Nuts and Set Screws.

Nos. 554 to 557, for set screw sizes (both ends) 7/16" to 3/4".
Nos. 562B to 568D, openings 5/8" to 2". Same opening both ends.

Heavy "S"-or Car Pattern
22½° Angle, Double Head. Long leverage wrenches primarily for railroad use.

Size range, 5/8" to 2-7/16" opening.

Construction Pattern

15 Angle. Straight handle. Deep opening for square nuts, and tapered handle for lining-up bolt holes.

Size range, 7/16" to 2" opening.

Structural Pattern

Straight opening. Offset handle. Deep opening for square nuts, tapered handle for lining-up bolt holes.

Size range, 7/16" to 2" opening.

Face Spanners

For general service.

Size range, 1" to 4" C to C of pins, in 1/4" multiples. Also Adjustable Face Spanners in 3 sizes with 2, 3 and 4" capacities.

Pin Spanners
For general service.

Size range, for circle diameters 1" to 6".

Hook Spanners

For Taper Nose Lathe Spindles and general service.

Size range, for circle diameters, 7-3/8", 9-1/4" and 12-1/2". Also Adjustable Hook Spanners in 3 sizes for circle diameters ranging from 3/4" to 4-3/4".

Pin Handle Sockets
With Hex or Square Opening for general service.

Size range:
Hex openings 5/16" to 2-3/8".
Square openings, 1/8" to 2".

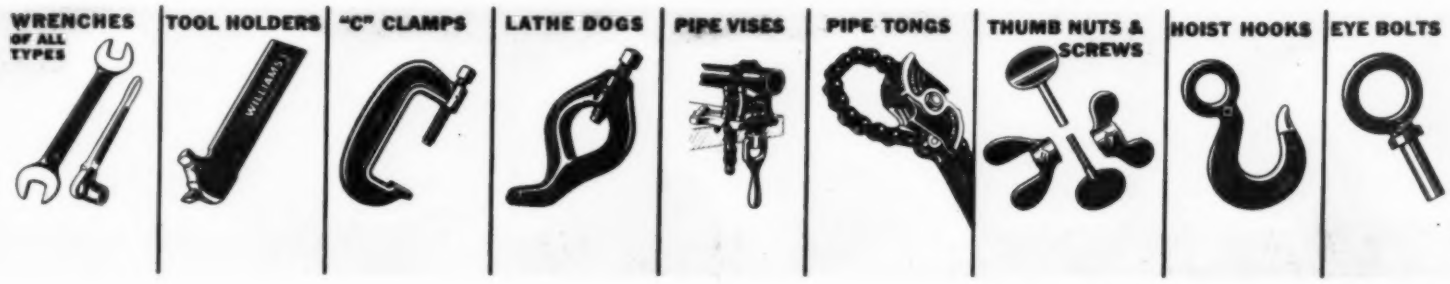
Offset Sockets

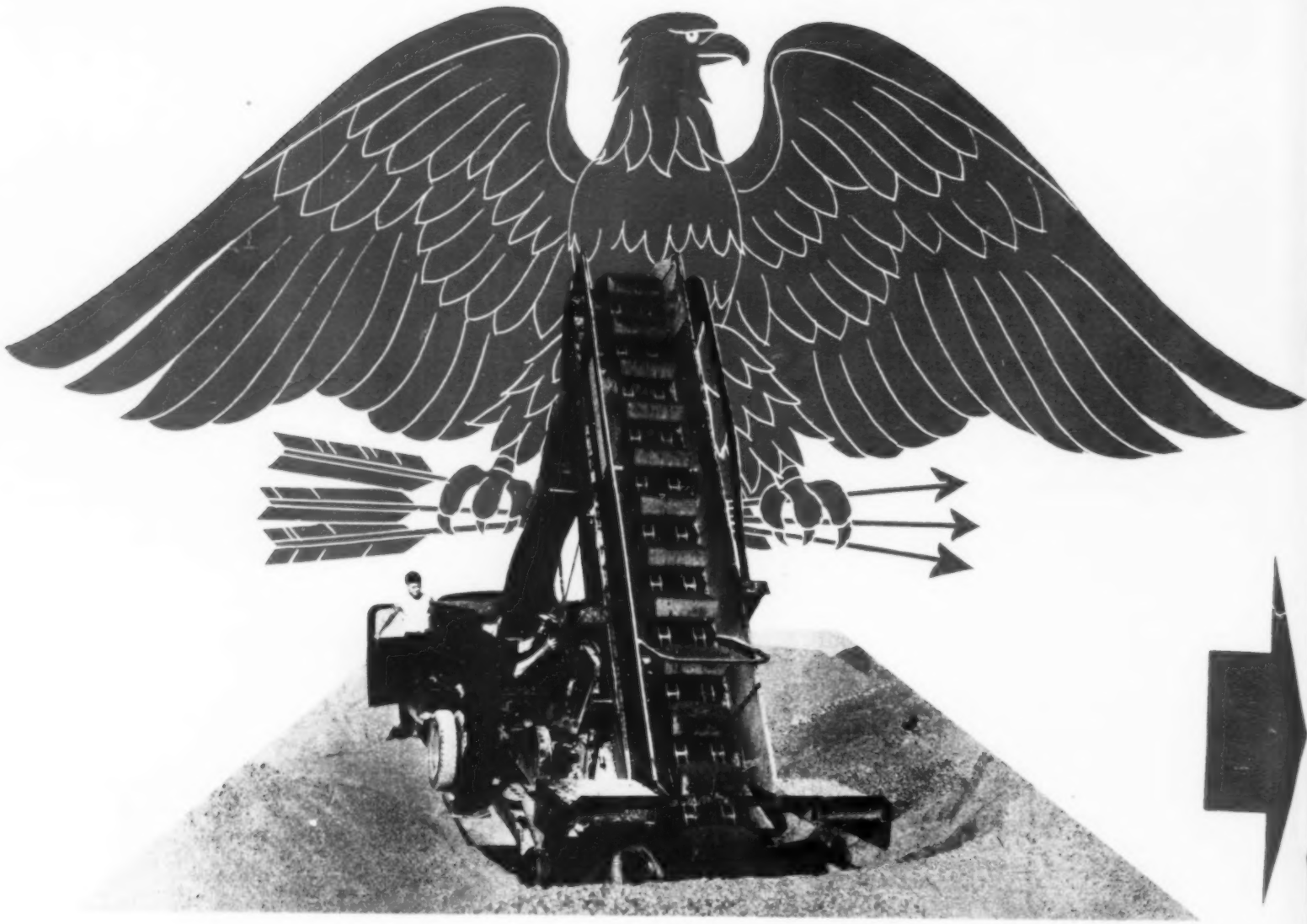
With Hex or Square Opening for general service.

Size range: Hex openings, 5/16" to 2-3/8".
Square openings, 1/8" to 2".

WILLIAMS
SUPERIOR DROP-FORGED TOOLS
Headquarters
for over half a century of
DROP-FORGINGS and DROP-FORGED TOOLS

Sold by Leading Industrial Distributors Everywhere

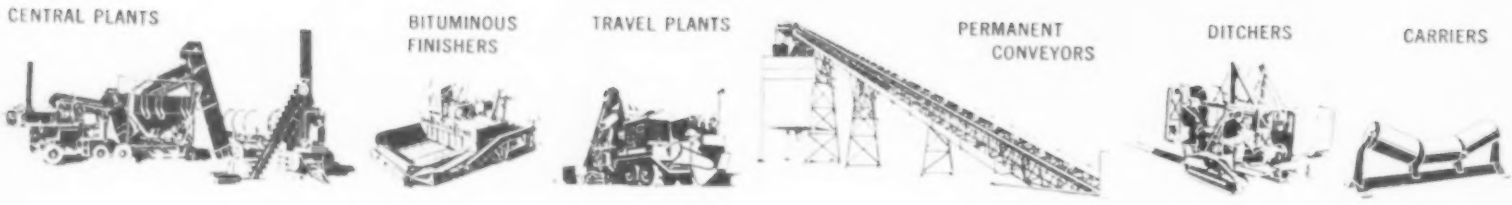




BARBER-GREENE OWNERS

AND THE

WAR



You Barber-Greene owners are fortunate in having machines which have proven their ability to last for years of service. During the present emergency, it is important that every precaution be taken to keep your Barber-Greene in good condition. The delivery of repair parts is becoming uncertain. Many broken parts are due to carelessness, or improper maintenance. It is impossible to outline here all of the points to be watched. Good, sound horse sense must be exercised.

THE IMPORTANCE OF LUBRICATION

Nothing can add to the life of the machine more than thorough lubrication of the moving parts, properly executed at the proper intervals with the correct lubricants. A breakdown resulting from improper lubrication is inexcusable. Correct and systematic lubrication can be maintained with little or no loss in operating time.

OPERATE WITHIN THE MACHINE'S CAPACITY

You will lay more road or handle more material in the long run by refraining from crowding your Barber-Greene. A good operator who has the "feel" of his machine can immediately sense an overload. There are times when momentary overloads cannot be avoided, but for the long steady pull, operate within the machine's normal capacity.

KEEP YOUR MACHINE IN PROPER ADJUSTMENT

Make regular checks of all of the adjustable points on your Barber-Greene. Particularly notice chain slack and bearings. A chain which becomes too loose can climb the sprocket and seriously damage the machinery.

WATCH SUCH VITAL POINTS AS THE AIR CLEANER

Your Barber-Greene is equipped with the air cleaner suitable for the type of work done by the machine. Many Barber-Greenes operate in highly abrasive dust which can wreck an engine if it gets into the cylinders. Carefully follow the instructions on the air cleaner, oil filter, etc.

ALWAYS GUARD YOUR RUBBER BELT

Load the belt evenly. Have a hopper or some other arrangement for preventing large chunks from striking the belt at the loading end. Keep the belt properly aligned. Do not convey hot materials with your Barber-Greene Belt Conveyor unless it has a special "hot belt." (Even a special hot belt can be damaged from material above 300 degrees or by hot material which is discharged onto the belt conveyor when it is idle.)

BARBER-GREENE COMPANY, Aurora, Ill., U. S. A.

"TAXIES" for Hell Buggies

Tanks move doggedly forward wreaking havoc on the enemy but their speed is necessarily slower than trucks and their span of continuous service considerably more limited.

So they crawl up on Rogers Trailers and are moved quickly to the line of combat—or from it when repairs or reconditioning becomes necessary.

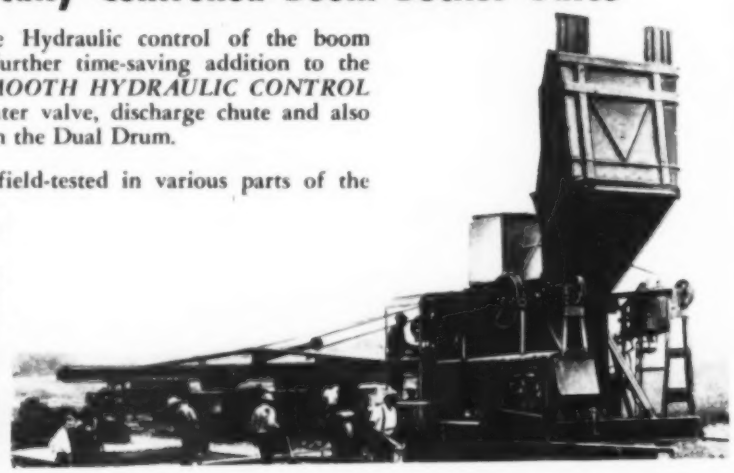
Thus, the effectiveness of an important combat unit is increased manifoldly by these non-combat vehicles.

ROGERS TRAILERS

ROGERS BROTHERS CORP.
ALBION, PENNA.

Ransome 34E Single and Dual Drum PAVERS with the NEW EXCLUSIVE Hydraulically Controlled Boom Bucket Gates

The New Ransome Hydraulic control of the boom bucket gates is a further time-saving addition to the only paver with *SMOOTH HYDRAULIC CONTROL* of boom swing, water valve, discharge chute and also the transfer chute on the Dual Drum.



This new feature, field-tested in various parts of the globe for more than a year, eliminates split batches, permits discharge of small portions of concrete at any location within boom reach without returning bucket to discharge chute, saves time of bucket travel for split batches and permits opening bucket gates to any degree at any point on the boom.

These are but a few of many advantages of this exclusive feature. Write for Bulletin No. 195.

RANSOME MACHINERY COMPANY
Dunellen New Jersey

Pre-framed Timber Bridge

(Continued from page 51)

Gresham, Ore. An arch span of 88 ft. was decided against the eventuality of the interurban right-of-way being transformed, at some future time, into a highway. The arch design was favored, also, because of its pleasing appearance.

A three-hinged arch was chosen because it could be erected without falsework and was, therefore, economical. It is spandrel-braced and divided into eight 11-ft. panels. The two trestle spans at each end are of uniform length, providing a symmetrical outline. Depth of the trusses is 21 ft. at the seat and 3½ ft. at the crown. Parabolic lower chords have a rise of 18 ft. and are spaced 18 ft. apart, c. to c. All joints are connected with Teco split rings.

Truss Members

Upper chords, arch ribs, and verticals are made up of two members each, with a filler between, making an H-section. The fillers are continuous and as long as the joint details would admit. Four Teco rings are placed in each end and two in the center of each filler. The members are bolted together through the filler at about 2-ft. centers throughout the length of the filler. This construction makes a very stiff compression member. The diagonals are of one piece and at the joints fit between the chords, while the verticals are placed on the outside.

Floor beams rest on the upper ends of the verticals, which project above the upper chord. A ½-in. steel bearing plate is inserted to distribute the load. In this manner, the loads are carried directly to the arch ribs without inducing bending stresses in the upper chords. This construction allows the upper chord to be made straight, thereby simplifying splices.

Each side of the upper chord is made up of one long and one short piece of 4½x14-in. material. Splices were made in adjacent panels; at each splice, one member is continuous. Ring connections into the filler made a splice having the necessary strength.

Lateral braces between the trusses are connected to the upper and lower chords with 2½-in. rings. Vertical members of the sway-bracing system are fastened by ⅜x7-in. lag screws, as the side pieces of the vertical truss members are not thick enough to accommodate rings.

The bridge supports a roadway 24 ft. wide between 9-in. curbs and 3-ft. walkways on both sides; the roadway is surfaced with a 2-in. depth of as-

(Continued on page 122)

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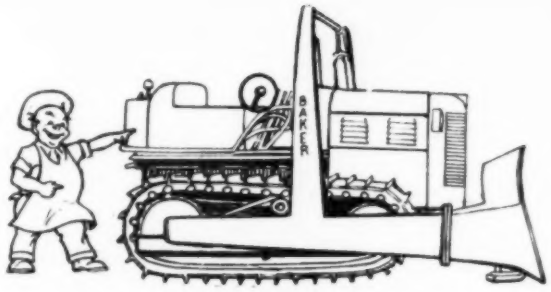

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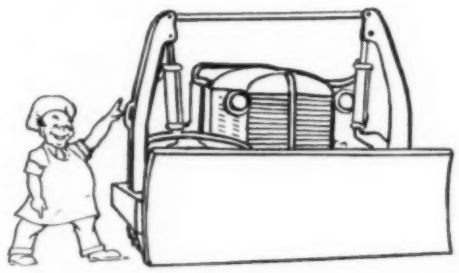

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(Continued from page 120)

phaltic concrete on a deck of 4x10-in. plank, matched as shiplap and fastened to the stringers with ⅜x8-in. lag screws. Each end of the bridge is supported by a concrete abutment and one frame bent resting on concrete pedestals. Arch footings are of concrete on gravel.

All structural members of the Multnomah County bridge were carefully detailed and fabricated before treatment. The trusses then were assembled near the abutments.

Erection of Trusses

In erection, an unexpected difficulty was encountered. It had been intended, originally to place the two halves of each truss simultaneously with truck-cranes; but, because only one crane was available, it became necessary to devise a method of holding one-half of each truss in position while the other was being placed. Deadmen were set in line with the trusses behind the abutment at one end of the bridge. The two half-trusses at that end were placed and guyed to prevent lateral movement. Cables then were fastened near the crown of each truss and run back to the proper anchorage, to which they were attached through a chain block to allow vertical adjustment of the outer end of the half truss. The truck-crane, a Lorain machine, next moved to the other end of the bridge and placed the two remaining halves, which then were connected to the previously erected half-trusses by pins driven at the arch crown.

As each half truss weighed about 7 tons, it could not be boomed out with a truck-crane from the abutment. To overcome this difficulty, the end bent was erected first and a false bent was set on the arch abutment. Stringers and plank decking then were placed over the trestle spans, enabling the truck-crane to move out to a position over the arch abutment where it could handle the trusses.

Bridge Handrail

Handrail for the bridge is a modification of the composite type, being entirely of wood. The cap is a 4x12-in. piece with the top beveled to each side of center. Double lower rails are 4x8-in. pieces, and the balusters, cut from 4x9⅛-in. stock, are held in place by two 2x3-in. strips bolted to the cap at the top and by a bolt through each baluster and the two lower rails at the bottom. For appearance, the posts are heavy, 13½x13½ in. The handrail caps are attached to the posts with 4x6x⅜-in. angles, and the lower rails with 6x⅜-in. brackets.

All the bridge timber was pressure-treated by the supplier, the West Oregon Lumber Co., Portland, Ore. George W. Buck, county engineer and roadmaster, is in charge of all Multnomah County road and bridge construction.

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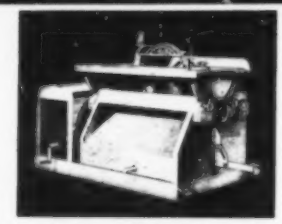

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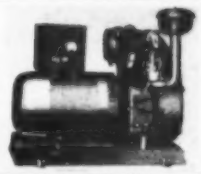

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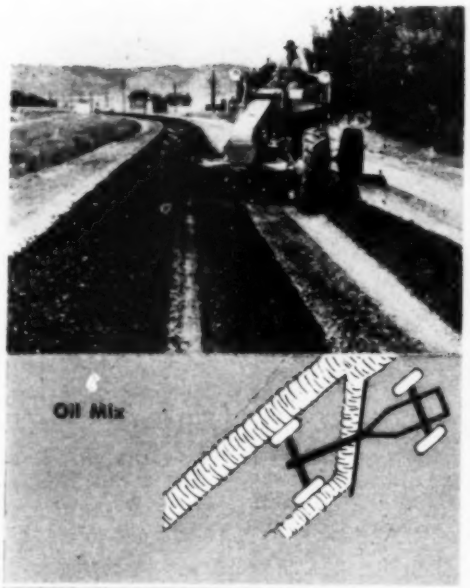

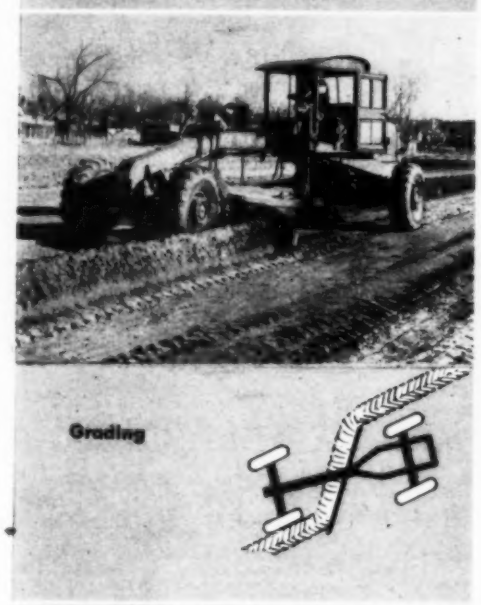

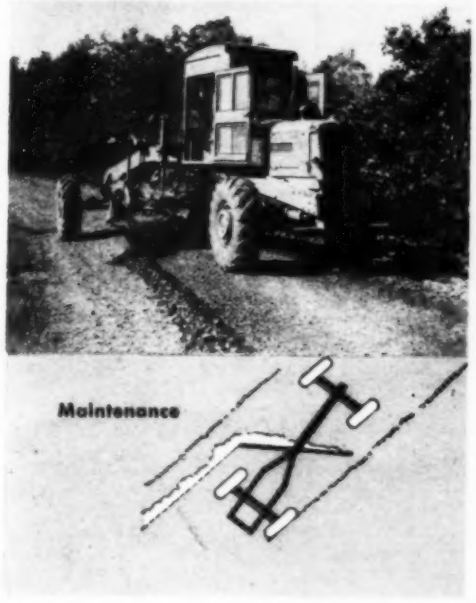

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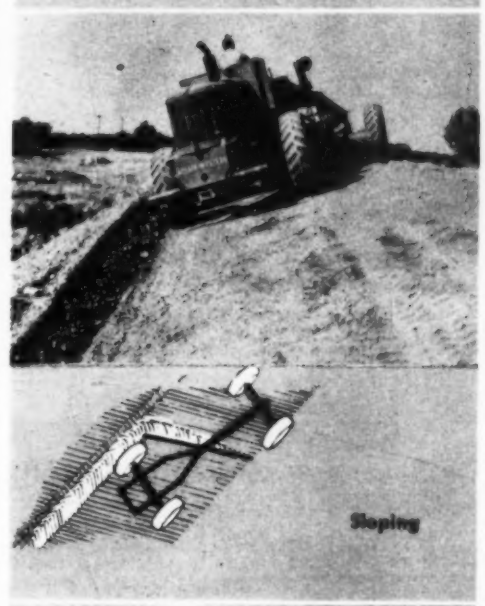

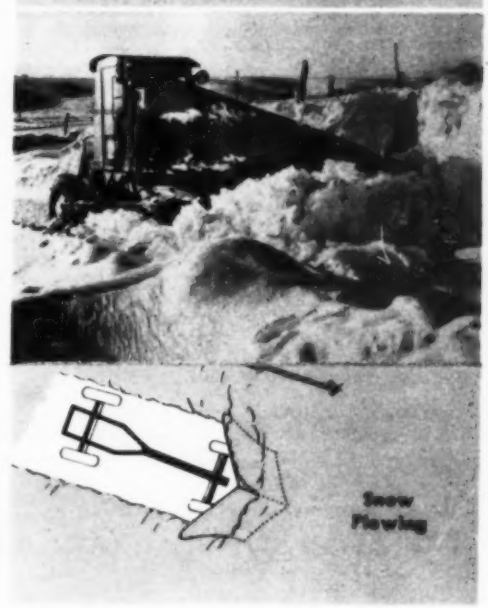

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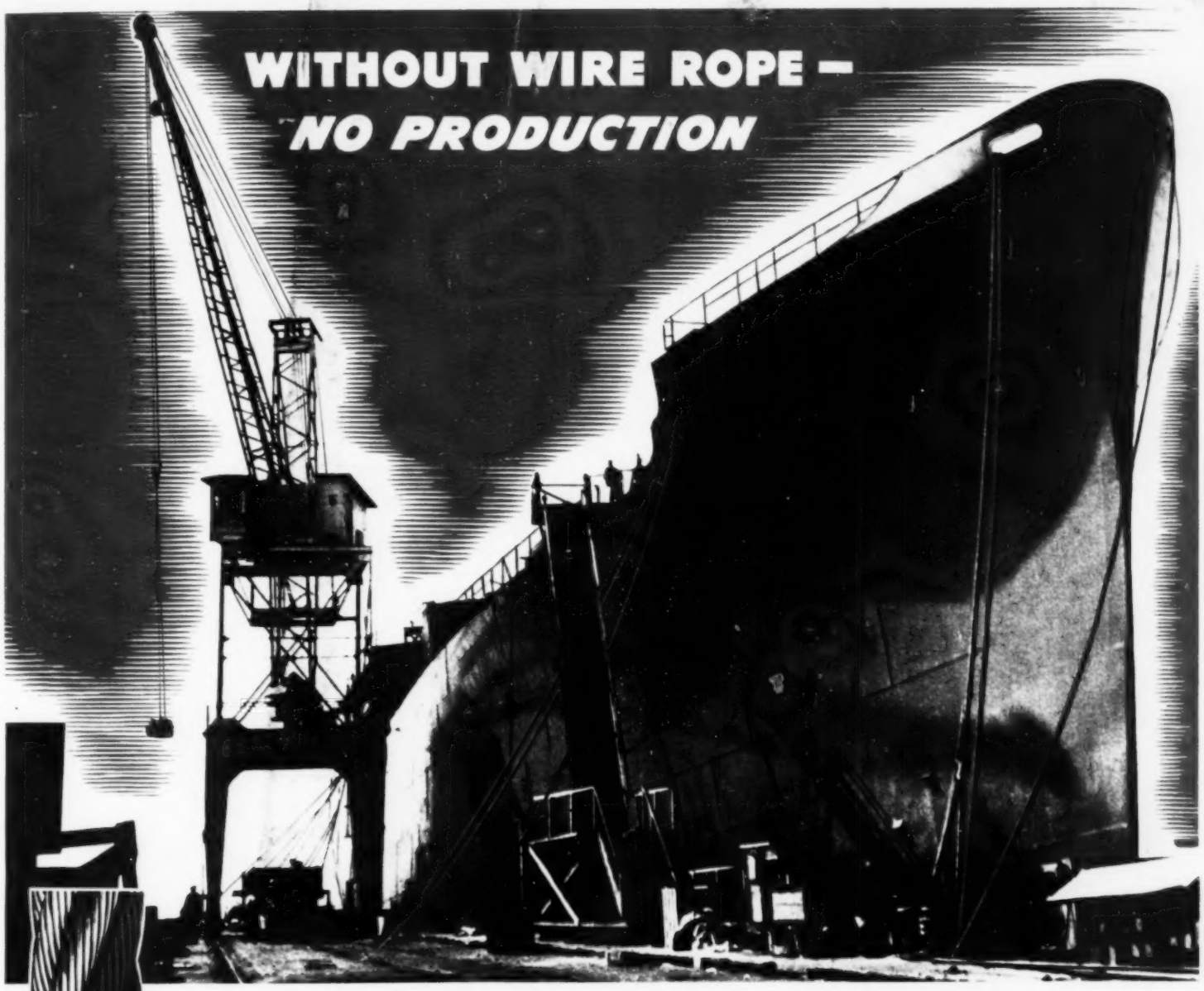

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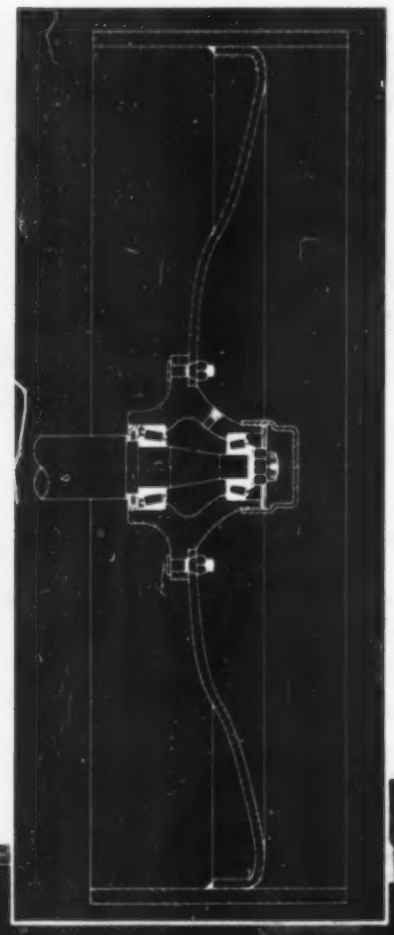

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